ESSENTIALITY TO THE NATIONAL DEFENSE OF THE DOMESTIC HOROLOGICAL INDUSTRY

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HEARINGS

BEFORE

PREPAREDNESS SUBCOMMITTEE NO. 6

OF THE

COMMITTEE ON ARMED SERVICES

UNITED STATES SENATE

EIGHTY-THIRD CONGRESS

SECOND SESSION

ON

THE ESSENTIALITY TO THE NATIONAL DEFENSE OF THE DOMESTIC HOROLOGICAL INDUSTRY

JUNE 30, JULY 1 AND 2, 1954

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ESSENTIALITY TO THE NATIONAL DEFENSE OF THE DOMESTIC HOROLOGICAL INDUSTRY

WEDNESDAY, JUNE 30, 1954

PREPAREDNESS SUBCOMMITTEE NO. 6,
SENATE ARMED SERVICES COMMITTEE,
UNITED STATES SENATE,
Washington, D. C.

The subcommittee met, pursuant to call, at 10:08 a. m., in room 212, Senate Office Building, Senator James H. Duff (chairman) presiding.

Present: Senators Duff, Cooper, and Stennis.

Senator DUFF. The meeting will come to order. As a duly constituted subcommittee of the Armed Services Committee, we are here to consider the problem of the essentiality of the domestic horological industry. These hearings are the final act of the work which the committee and its staffs have conducted concerning the industry. We have secured data from all of those who might have an interest in the inquiry. Our consideration this morning will be to hear from those people in Government and industry directly affected and who can best represent the various views which may be expressed.

We acknowledge the study and interest which the chairman of the Senate Armed Services Committee, Senator Saltonstall, has shown in this case and I should like to insert in the record at this point the letter from Senator Saltonstall establishing this subcommittee.

(The letter follows:)

UNITED STATES SENATE,
COMMITTEE ON ARMED SERVICES,
May 22, 1954.

Hon. JAMES H. DUFF,
United States Senate,
Washington, D. C.

DEAR SENATOR DUFF: As you are aware, there has been considerable concern over the difficulties which the domestic watch industry is facing. You will recall that this matter has been covered in part on the floor of the Senate and in detailed reports which several of the departments of Government have prepared. It is my conviction that, before we allow the domestic watch industry to be forced out of business by foreign competition, the Senate Armed Services Committee should satisfy itself as to the importance of this unique industry to our national defense.

I should like to ask you to serve as chairman of a subcommittee with Senators John Sherman Cooper and Lester C. Hunt to look into this serious situation. It shall be the responsibility of the subcommittee to study and report to the full committee on the essentiality of the American watch manufacturing industry to our defense structure.

I should appreciate it if you would advise me whether or not it will be possible for you to serve.

Sincerely,

LEVERETT SALTONSTALL,
Chairman.

Senator DUFF. After the death of Senator Hunt, the junior Senator from Mississippi, John C. Stennis, was appointed to the subcommittee. We also acknowledge the interest of Senator Styles Bridges, chairman of the Senate Appropriations Committee. He has demonstrated an interest and concern which we recognize.

Senator Prescott Bush of Connecticut has submitted a statement to the subcommittee which will appear in the record at this point.

(The statement follows:)

STATEMENT OF HON. PRESCOTT BUSH, SENIOR SENATOR FROM CONNECTICUT

I am grateful for this opportunity to express my deep interest in the important study which has been undertaken by this subcommittee.

The problems of the watch and clock industry, important segments of which are located in my own State of Connecticut, were brought to my attention in connection with the work of the Commission on Foreign Economic Policy on which I had the privilege of serving.

The great contributions of this industry to our national defense in both World War I and World War II, and the difficulties it has encountered in the post-World War II period, were among the factors which led me to include this statement in the Randall Commission's report:

"Our productive power is our mightiest weapon in war. Defense plants and workers cannot be stockpiled.

"Industries vital to our defense should be maintained at reserve strength levels. Tariff protection may be necessary. Other steps such as placement of defense orders, may also be needed. There may be cases where such measures would be more effective for the industry concerned, and better for our economy, than import restrictions."

The watch and clock industry has recently presented its case before the Tariff Commission under the escape-clause procedures included in the Trade Agreements Act. I am hopeful that the Commission's findings, already submitted to the President, will provide relief, and that the President will accept the Commission's recommendations.

The evidence presented to the Tariff Commission, in my judgment, demonstrates beyond question the importance of this industry to the national defense. I am confident that this subcommittee's studies will result in a conclusion that the horological industry is essential to a sound mobilization base, and that recommendations will be made to ensure that America will always have available, in time of emergency, the essential skills of the craftsmen who man its machines.

In this connection, I trust that the subcommittee will give serious thought to specifying the "other steps" which were referred to in my statement in the Randall Commission's report. The placement of defense orders is only one illustration of what might be done. I hope that this subcommittee, in consultation with the Department of Defense, will be able to reach sound recommendations for other possible means.

I believe the subcommittee will be interested in a brief recital of what has happened to the industry in the past 18 years. In 1936, the American industry produced over 80 percent (12½ million) of all watches sold in this country. That year the United States negotiated a trade agreement with Switzerland which reduced tariffs on watches by an average of 35 to 50 percent. Because the duty is partly specific, the inflationary trend in this country has further reduced the ad valorem equivalent. Watches have a very high proportion of labor cost in their manufacture, averaging around 84 percent of the total cost. Wages paid to American watch workers are 3 times the rate paid in Switzerland, 6 times the rate paid in Germany and 11 times the rate paid in Japan. Since the productivity of both Swiss and American watchworkers is the same, American manufacturing costs are much higher than those in Switzerland. The number of workers employed in the American watch industry has dropped sharply while in Switzerland it has increased about 50 percent over the prewar period.

As a result, the American industry has declined both actually and relatively since 1936 despite a vastly expanded domestic market until in 1953 it accounted for only 30 percent of the total watch sales in this country: imported watches constituted 70 percent of total sales. At the present rate of decline of the domestic industry and the present rate of growth of the Swiss watch cartel, the American horological industry will find it economically impossible to produce watches within a few years.

During World War II the industry devoted itself to producing items for defense which require the unique skills of horology, such as fuses and other timing mechanisms. It produced 80 percent of all the mechanical time fuses, rocket fuses and V. T. fuses used by our armed services and 95 percent of the critical parts in those fuses. In the Korean war the armed services again looked to this industry to supply their requirements for timing mechanisms. The advanced techniques of modern warefare are increasingly dependent on timing elements designed and produced by this industry.

In 1953 the Tariff Commission found the industry was threatened with serious injury from imported watches. Since then the industry has continued to decline and has produced fewer and fewer watches. For this reason, a new proceeding was brought before the Commission this year. With the very recent termination of the mechanical time-fuse program there have been heavy layoffs of employees because there is not watch production to absorb them. This results in a serious loss of critical skills and in an inability on the part of the industry to convert quickly to mass volume production of timing mechanisms for defense. England, France, Germany, Japan, and Russia are today building up their horological industries. The United States is the only country having a horological industry which is not actively strengthening it.

Mr. Chairman, if we permit the watch and clock industry to decline further we face the danger of crippling our national defense. Other nations have recognized the critical importance of this industry. It is time that we in the United States put complacency behind us, and take steps to make certain that should an emergency arise we will be prepared for it.

Senator DUFF. We have scheduled our witnesses this morning in a manner to call the Government witnesses first. They are in a position to point out what things the industry has done in the past and what type of work it may be expected to perform if there should be a conflict in the future.

Next, we have asked that representatives of the domestic horological industry appear and tell of their past achievements, their present research and the development work that they are doing, and the kind of skills they can make available should an emergency arise at some date in the future.

I should like to mention at this point that we are not here to consider the problem which has been placed before the Tariff Commission regarding foreign competition. We are directing our attention solely to the matter of defense essentiality. It is not our responsibility to invade the jurisdiction or competence of the Tariff Commission in this investigation. It is the desire of the committee that we proceed with these hearings in a way, if possible, to conclude them today. And for that reason, wherever possible we hope that statements of position will be filed for the record and that any verbal comments may be made in addition thereto in order to expedite the hearing. That is especially true of the Members of Congress, a number of whom have submitted statement to the filed.

I assume there will be others here who will wish to file a statement as to their position as a matter of record, plus any verbal statements that they may wish to make in connection therewith.

Before we begin our deliberations, let me say that much information, both classified and unclassified, has already been gathered. We have been considering this data, and we will continue to study it. We do not mean to convey to the public or to the witnesses that our interest in brevity is indicative in the slightest degree of the fact that we are not interested in securing all of the facts which bear on this problem, and we will give whatever time may be necessary in order to make it complete.

I should like preliminarily to make a statement and have this investigation gotten under way. The Department of Defense undertook

a study of one branch of this industry to determine whether or not it was essential to the national defense. This report is classified "Secret." So far as I know, the industry does not know what information this report contains or the conclusions at which it arrives.

It is obvious that any such inquiry would stir up considerable speculation among the entire industry. The industry and the American people, however, are entitled to an unclassified look at the problem and its solution. Let me state for the benefit of the public and all the witnesses present that we do not propose to consider one segment of the horological industry, but we plan to treat the matter in its entirety. We will determine whether or not the industry is or is not essential to the national defense as a conclusion that we reach after hearing the testimony.

There has already been presented a statement in writing by Senator Bush, of Connecticut, who is obligated to attend another meeting. This statement has been filed in the record.

I have also been given a statement by Senator Hugh Butler of Nebraska which he would also like to have filed at this point as an expression of his opinion.

There have also been filed and will be made part of the record at this point statements by the following members of Congress:

Senator Walter F. George, Speaker of the House Joseph W. Martin, Jr., Congressman Chauncey W. Reed, and Congressman Richard M. Simpson.

(The documents follow:)

STATEMENT OF THE LATE HON. HUGH BUTLER, FORMER SENIOR SENATOR FROM NEBRASKA

On two occasions this month, I have called the attention of the Senate to a situation of vital importance to our national security. I refer to the recommendation that the tariffs on imported Swiss watches and watch movements be increased in order to prevent the imminent destruction of our domestic jeweled-watch industry. I should like to offer copies of these statements as they appeared in the Congressional Record as part of this hearing.

Since Lincoln, Nebr., is the home of the only complete jeweled watch-producing plant west of the Mississippi, I have had many opportunities to study the capabilities and problems of this industry and its 2,300 skilled Nebraska workers, most of whom are engaged in defense work.

From firsthand observation, I am quite familiar with the fact that it requires many years to establish a completely integrated jeweled-watch plant and train workers in the unique, special skills needed to produce precision timing devices and their component parts.

I wish to emphasize to this subcommittee that, according to the best military opinion, our country needs to maintain the skills, capabilities, and facilities of a going, thriving, and developing domestic jeweled-watch industry if we are to have an adequate supply of jeweled bearings, timing mechanisms, and other horological devices which are indispensable in our modern arsenal of land, sea, and air defense weapons.

I have reported to the Senate on June 11 and June 16 the results of my personal investigation of the alarming truth that our United States jeweled-watch industry is on the verge of destruction despite the fact that, as we all should realize, it is the only industry outside of Switzerland which has the skill and capacity to create and manufacture the timing mechanisms which are so obviously essential to our national security and defense.

In order that this committee may have the information bearing on the defense essentiality of this industry and the threat of extinction which it faces if not granted equitable treatment, I would like to include my two previous statements before the Senate as a part of the record of this hearing.

Though I am seriously concerned over the grave possibility that the destruction of the United States jeweled-watch industry may rob Nebraska of a

valuable and productive industry in which we can take great pride, I am equally concerned over the possibility that grave military weaknesses could result if we lose our jeweled-watch industry and if our Armed Forces are forced to depend solely on the Swiss watch cartel for the necessary timing devices.

In the interests of preparedness, I should like to emphasize to this committee that our country can stockpile militarily-essential raw materials and commodities—but unless precision production skills are preserved in a going industry they can easily be lost and once lost, difficult to restore and rebuild.

I submit to this committee that we cannot pursue the obvious national folly of exporting our jeweled-watch industry to Switzerland, where its capacity may again be taken over by our enemies leaving our own Armed Forces without a ready supply of the timing devices and mechanisms they will need for our defense.

UNITED STATES SENATE,
COMMITTEE ON FINANCE,
June 19, 1954.

Hon. JAMES H. DUFF,
Chairman, Preparedness Subcommittee No. 6,
Senate Armed Services Committee, United States Senate,
Washington, D. C.

DEAR SENATOR DUFF: Let me thank you for the notification of the hearing scheduled for Monday, June 21, 1954, concerning the maintenance of the watch and clock industry in the United States.

While I would like to attend, I find that it is not possible for me to do so and I will appreciate your making the following statement a part of the record:

In connection with the study being made by this special subcommittee, I should like to express the strong conviction I have always had that the domestic watchmaking industry is indispensable to our national security. The basic security problem arises from the fact that this industry depends upon unusually specialized skills and facilities. These skills cannot be stockpiled in the usual sense but must be kept keen on their regular watchmaking jobs. Furthermore, the key skills are so specialized that it takes several years to train and develop them.

By reason of these unique skills and facilities, along with the industry's interrelated skills in precision research, design, and toolmaking, the watchmaking industry is the only industry I know of that can make military time pieces—not to mention such tiny precision items as jewel bearings and many key components for fuses, guided missiles, and similar mechanisms needed in modern warfare. It would be a national catastrophe, in my judgment, should the making of jeweled watches in this country be allowed to cease. Should that happen, and this country be faced by another war emergency, we would not be able to recreate this industry and its key skills in less than several years.

Sincerely yours,

WALTER F. GEORGE.

HOUSE OF REPRESENTATIVES,
THE SPEAKER'S ROOMS,
Washington, D. C., June 21, 1954.

Hon. LEVERETT SALTONSTALL,
Chairman, Senate Armed Services Committee,
Senate Office Building, Washington, D. C.

MY DEAR SENATOR: I understand that a subcommittee of the Senate Armed Services Committee has concerned itself with the plight of the American watch and clock industry as a result of intense competition from abroad.

In addition to its importance to our domestic economy, I know that your committee will approach the problem of maintaining this industry as an essential component of our national defense.

During World War II, innumerable timing devices of all types, many of them of the utmost complexity requiring exact and delicate skills, were supplied by our American watch manufacturers. In addition to timepieces and navigational instruments, the watch and clock industry is the primary source of fuzes in time of war.

I understand that whenever the armed services are in need of a timing or related device, they customarily come to the research and engineering experts

of the watch and clock industry if the article sought is something that requires extreme precision or ultra-close tolerances.

For these and other reasons, I believe the survival of the domestic watch and clock industry is vital to the national welfare. It should be protected and encouraged. If the industry were permitted to perish, it would take many years to reestablish it.

Sincerely yours,

JOSEPH W. MARTIN, JR.

STATEMENT OF HON. CHAUNCEY W. REED, REPRESENTATIVE OF THE 14TH DISTRICT OF ILLINOIS

From long and intimate knowledge of the domestic jeweled-watch industry, which is one of the largest employers of precision labor in my district, where it has been the principal source of income for literally thousands of families over the past 90 years, I am well versed in its indispensability to the Nation's security in wartime.

I worked closely with executives of the Elgin National Watch Co. during both World War II and the Korean war and know from personal knowledge how they accepted impossible assignments and carried them out with almost unbelievable precision and skill. I witnessed the incredible failure to recognize the importance of this industry at the onset of the war, when a good share of its labor force melted away because somewhere in the war production planning no one had recognized the vital importance of timepieces and timing instruments to the operation of a modern war machine. I sincerely hope that that situation is not repeating itself. The production of watches and clocks and the countless precision products that only these factories can produce should be recognized as one of the 4 or 5 truly indispensable wartime industries of the Nation.

We are not talking about the preservation of a buggy whip industry that is seeking to survive in the face of technological advances.

We are talking about one of the Nation's most efficient and most needed industries which is being throttled before our eyes by a rapidly tightening economic noose. And when the last breath is squeezed from that industry where are we going to get fuzes so cleverly contrived that the nearness of the target explodes their projectiles?

Where are we going to get the hundreds of precision ammunition components needed for modern warfare? Where are we going to get thimble-sized fuses, smaller than a lady's wrist watch, that double present rocket capacities of pursuit aircraft? Where are we going to get marine chronometers, first mass-produced in this country under the pressure of wartime emergency?

The Swiss and the importers who have flooded this country's markets with their watches say that we can get them from companies outside the horological field.

But whose word are we going to take—that of the Swiss whose only objective is to sell their watches, without any regard to the national self-interest of this country? Or are we going to take the word of the people who know how indispensable this industry is to our national security—the procurement officers of World War II who begged, pleaded, and exhorted the American watch industry to achieve miracles of production and who said repeatedly that without the watch industry the war effort would have been seriously affected.

Every sound, practical investigation of the horological industry's essentiality to our national security has resulted in the same conclusion: The industry is indispensable to our national defense. This was brought out by the Tariff Commission in 1947 when it said:

"Except for the existence of established manufacturers of jeweled watches of quality, the Army and Navy could not have procured precision time instruments of the high quality, and in the large quantities and in the limited time which they did. * * * The continued existence of facilities such as these manufacturers possess may, therefore, be regarded as essential to the maintenance of our security."

This opinion has since been supported in the strongest possible terms by the reports and statements of Hubert Howard, Chairman of the Munitions Board; the National Security Resources Board; the retired Chief of Army Ordnance, Lt. Gen. Levin H. Campbell, Jr.; and by the Chiefs of the Bureau of Ships and of the Bureau of Ordance of the Navy; by the Assistant Chief of Air Staff of the Army Air Force; and by a number of other authoritative sources who know from first-hand experience or from thorough study that the watch and clock industries must

be kept in a healthy, active condition if the best interests of the Nation are to be served.

It is my considered opinion that if the watch-manufacturing facilities of this Nation are allowed to wither away the safety of our country will be endangered.

HOUSE OF REPRESENTATIVES,
Washington, D. C., June 23, 1954.

Hon. JAMES H. DUFF,
United States Senate, Washington, D. C.

DEAR SENATOR: As you know, I am very much interested in the matter of our tariffs and imports. For that reason, it is my desire to offer the enclosed statement for inclusion in the record of hearings being held by the Senate Preparedness Subcommittee, of which you are the excellent chairman.

I shall appreciate very much your kindness in referring the enclosed to the proper member of your staff, and with kind personal regards, I am

Sincerely,

RICHARD M. SIMPSON, M. C.

STATEMENT OF HON. RICHARD M. SIMPSON, REPRESENTATIVE OF THE 18TH DISTRICT OF PENNSYLVANIA

Since I have been in Congress I have been intensely interested in the Foreign Trade Program and legislation pertaining to it. It is well known that I have been a strong advocate of escape-clause and peril-point procedures in the Reciprocal Trade Agreements Act.

One industry that has been of particular interest to me is the domestic jeweled watch industry. One of the famous landmarks in my home State is the Hamilton Watch Co., at Lancaster, Pa. For many years I have assisted the management of this company in their struggle against the tide of Swiss imports, which have taken over their market as a result of our inadequate trade policies.

Although the proponents of the reciprocal trade program have made much of the escape-clause procedures in selling that program to Congress and to the country, the trade agreement in which our tariffs on watches were slashed did not contain such a provision. Bad administration of the laws provided by Congress for the relief of injured industry has rendered the entire procedure ineffective.

In 1950 an escape clause was at long last negotiated into the trade agreements and the jeweled watch industry applied to the Tariff Commission for relief and obtained a finding of a threat of serious injury. President Truman turned that recommendation down, ignoring the findings of fact. Since that time the watch industry has steadily declined. Eighty-two percent of the American market for jeweled watches is now supplied by importations. Production in the American industry has declined almost 50 percent since 1951, and for this year will be less than the production of watches in the United States in 1936, the year of the trade agreement with Switzerland which reduced watch tariffs to their present low levels. Employment has fallen in like measure, causing loss of work and loss of skills to many of our finest craftsmen.

In my opinion, these reasons alone compel the acceptance of the most recent recommendations of the Tariff Commission that the duties on imported watch movements be increased. This is precisely the type of situation for which Congress intended to provide a remedy.

But the study of this committee is aimed at another facet of the problem that should be of concern to every American.

Only from the domestic jeweled watch industry can our armed services obtain the thousands of accurate quality timepieces and timing devices needed in time of war. In World War II, and again in the Korean conflict, these watch companies supplied timepieces, fuses, and other devices which were essential to the war effort. This fact of essentiality to the national defense is a further compelling reason for granting relief immediately to this industry. Its skills must be preserved in the national interest.

My opinions on the trade program and the need for an adequate escape-clause procedure are well known. I am firmly convinced that if ever a case were established for relief, considering only the economic factors usually discussed, the jeweled watch industry has made that case. When these facts are coupled

with the findings of essentiality to the national security, which is apparent by an objective appraisal of the contributions of this industry to national defense in the past, the case for relief becomes overpowering. If our trade program is to be administered in the national interest, immediate relief must be granted to the watch industry.

Senator DUFF. If there are any other Members of Congress, or their representatives, who desire to file statements at this point, I wish they would present them so that they could be made a part of the record at this point.

There has been handed me a statement by Senator Edward Martin, which will be included in the record at this point.

(The statement follows:)

STATEMENT OF HON. EDWARD MARTIN, SENIOR SENATOR FROM PENNSYLVANIA

I appreciate the opportunity to make this brief statement expressing my views as to the essentiality of our domestic jeweled watch industry, and the necessity for its preservation, in the interests of national defense.

It is a matter of considerable concern to me and to the representatives of the watch industry located in the State of Pennsylvania, that on April 26, 1954, the Department of Defense submitted to Dr. Arthur Flemming's interdepartmental committee, a report which virtually eliminates the United States jeweled watch industry as essential to the Nation's mobilization base.

The appointment of this subcommittee to study the underlying factors of this report is gratifying, and I feel sure its conclusions will throw light upon the whole subject.

As the subcommittee knows I have been a member of the Armed Forces virtually all of my life, and all matters concerning the national defense are of great personal concern to me.

It hardly seems necessary for me to point out that the United States has the only jeweled watch industry of any consequence in the world, outside of Switzerland.

I think sufficient evidence can be submitted to show that no other industry could make jeweled timepieces in the event of war, nor could such an industry be created in the event of an emergency to take the place of the existing industry, if it is allowed to deteriorate.

As I am sure the subcommittee knows, only one company in the United States has ever produced marine chronometers for military use in the United States. This was done under wartime pressures by the Hamilton Watch Co. Hamilton required 18 months to get into volume production. Although currently producing small quantities of chronometers, Hamilton estimates that it would require at least 9 months lead time to reestablish mass production. Late in World War II, the Elgin National Watch Co. was requested by the Government to establish production of chronometers as an alternate source, and by the end of the war was ready to produce.

I point out these instances in illustration of the fact that special techniques and know-how are unique in the jeweled watch industry and are essential to national-defense requirements. Such production could not be easily recreated or substituted once its executives and workers are forced into other activities for their economic survival.

I also call to your attention that the Department of Defense report completely ignores the matter of jewel bearings. The subcommittee knows that the jeweled watch industry was deluged with urgent demands during World War II in this field.

It is my opinion that the departmental appraisal of the importance of this industry has been affected by other objectives, especially those relating to the tariff. If such is the case, this is most regrettable, because it is not a proper consideration.

It is my earnest request that this subcommittee thoroughly explore the factual information upon which the Department of Defense report is based, as well as any unusual conclusions on the subject which may have been submitted by groups more interested in the preservation of an import trade, than the survival of the jeweled watch industry in the United States.

Senator DUFF. Are there any other statements that should be made a part of the record.

(No response.)

Senator DUFF. I would like it to appear of record that Senator Purtell will also appear later and file a statement as well as Senator Kennedy. Senator Purtell is from the State of Connecticut and Senator Kennedy is from Massachusetts.

Several other documents have been submitted to the subcommittee and will at this place be put into the record. They include:

A statement of Lt. Gen. Levin H. Campbell, Jr., United States Army, retired, made before the Tariff Commission on February 11, 1954, which General Campbell has authorized to be included in our record.

A statement by George W. Fraker, general manager of the Ordnance Division of Elgin National Watch Co.;

Letters from Hager & Bro., Inc., Lancaster, Pa.;

A letter and statement of Roy T. Hurley, chairman of the board and president of Curtiss-Wright Corp.;

A letter of M. F. Schoeffel, Chief, Bureau of Ordnance of the Department of the Navy;

A statement of J. H. Gichner, commander, United States Naval Reserve;

A statement of Robert Larsen;

And finally, copies of correspondence between the Navy and the Hamilton Watch Co. during World War II.

(The documents follow:)

STATEMENT OF LT. GEN. LEVIN H. CAMPBELL, JR., USA (RETIRED), BEFORE THE TARIFF COMMISSION, FEBRUARY 11, 1954

General CAMPBELL. My name is Levin H. Campbell, Jr. I am a lieutenant general of the United States Army, retired, retired in 1946.

From there I went as executive vice president of the International Harvester Co., from which I again retired at age 65. And at the present time I am the chairman of the Automotive Safety Foundation and a director of a few companies, and that sort of thing.

I was asked by Mr. Ingraham in writing several months ago if I would be willing to appear before the Commission and tell what I know about the horological industry's connection with the manufacture of mechanical time fuses.

I would like to say that I am here, gentlemen, without a fee. I would not accept a fee for anything in this world. I am paying my own expenses, which is not very much. I will not ever accept anything for this appearance.

So on that basis I will proceed.

In the late thirties I was works manager for the Frankford Arsenal in Philadelphia, and engaged in other things in the manufacture of the mechanical time fuses.

I thought along about 1938 that we were going to get into a war and I began to wonder how we could increase the base of manufacture for mechanical time fuses.

You gentlemen will know, of course, that our arsenals of the Ordance Department can only handle about 4 percent of the total production of a major war. Therefore, it was obvious that we should have to have larger sources.

I thought of the watch and clock industry and went first, as I recall, to Westclox at La Salle, Ill., where a timepiece known as Big Ben is made, or was, at least.

I got them interested in our problem, because after all the mechanical time fuse, gentlemen, is nothing but an alarm clock. It is set to go off at a given number of seconds after being expelled from a gun, usually, at about 2,600 feet per second, and is spun out at a revolution of 16,000 revolutions per minute.

I can imagine your watch being treated that way, and still going off when required, or your alarm clock.

We found these people were equipped with the necessary machine tools, high-grade equipment, and above all the know-how to make a mechanical timepiece. That is very important. The know-how.

The most we can find is people who can make parts in precision, but to get somebody to make a timepiece which would operate under those conditions was a very difficult problem. And, naturally, we turned to this industry.

We got several companies making these various parts which we sent down to this arsenal where I was, and we assembled them.

Later on we interested several of them in the manufacture of this fuse in small quantities at that time, this being 1939 and 1940.

When the war came, or sometime before that, I should say, even 18 months before, we interested a number of these companies in making the fuse and making parts. The small companies were to be helped by the large ones. We were to help them all with the initial know-how from the arsenal. And we proceeded then to make the mechanical time fuse. And after these many years I cannot remember how many millions we made, but it was very, very sizable.

The war is over. And this last one is over, too, I hope.

And now we ask ourselves what are the mechanical time fuses of today. Of course, as you remember, in the last war, the last part of the war, we released what was known as the VT fuse. That was what we called for short a radio fuse. It was very accurate. And they were built by various electrical manufacturers who were equipped to make precision parts.

At the end of the war we used them not only over water, but over land as well. We had not used them over land, because we were afraid some of them might go off and the Germans or the Japs would get them and imitate them, and we did not want that done.

You might well ask, have they taken the place of the mechanical time fuse? Not altogether. I am told after having been out of the Army for 8 years. They may, I do not know. Anyone who predicts ordnance development years ahead is a very bold or very rash person, I would say.

It may well be that this radio fuse, the VT fuse, may be one that an enemy will work out some means of jamming in the air with a radio wave or some electronic means. If so, the fuse will be of no use unless we can get countermeasures against such jamming. I do not know. No one knows, so far as I know.

The mechanical time fuse may come back into the millions again. I really do not know.

I think that is all of the statement that I have, unless someone would ask some questions.

Mr. REEVES. I would like to ask some additional questions, if I may, General Campbell.

Between the years 1942 and 1946 you were the Chief of Ordnance of the United States Army, were you not?

General CAMPBELL. Yes, I was.

Mr. REEVES. And the procurement of all materiel in ordnance, the general ordnance area, was directly under your jurisdiction?

General CAMPBELL. That is correct.

Mr. REEVES. Prior to the time you became the Chief of Ordnance, you were chief of a division in the Office of the Chief of Ordnance, were you not, sir?

General CAMPBELL. I was in charge of production, yes.

Mr. REEVES. And did there come a time during that period when it was proposed that additional Government-owned facilities be built for the production of these mechanical time fuses?

General CAMPBELL. Yes, I remember that very well.

Mr. REEVES. Will you relate the circumstances, sir?

General CAMPBELL. There was a young officer who was in charge of fuses in general, and he came to me, and he said that he wanted to build, as I recall, five more plants to make the mechanical time fuse.

These "little things" only cost as I remember, about $15 million apiece. And it took about 18 months to make them. As you recognize by my name, I am a Scotchman, by descent, at least, and I said that we were not going to do any such thing. And how in the world we were going to get the fuses at that time, I did not know.

It kept me awake several nights, because I was in charge of production. I thought that my head would go in the basket. And you will pardon this personal reference, please, Commissioners, but one morning here in Washington I was shaving, and all at once I saw this thing just like that, what I could do.

I got a man named Roy Hurley, who is now the president of Curtiss-Wright and at that time was with Bendix. I met him up in New York. I said, "I have a dream, and that is to get all of these watch and clock people under the same tent, in effect, in one company, and let them trade parts, secrets, know-how, men, machines, anything else required."

I went to Congress, and we got an act passed, so that they would not go to jail for violation of the Sherman Act. And in effect we had one company of the watch and clock industry making time fuses during the war.

Does that answer your question?

Mr. REEVES. That answers my question, sir. The significance of that, if I understand your testimony correctly, is that the essential ingredients in the mechanical time fuse is the timing element.

General CAMPBELL. It is no good without that, no.

Mr. REEVES. It was the timing element which you could procure from the watch and clock industry that was required, is that correct, sir?

General CAMPBELL. That is correct.

Mr. REEVES. Was there any other industry in the United States, to your knowledge, and based on your experience, which was capable of producing that critical element of the time fuse?

General CAMPBELL. Not so quickly, no. Of course, I claim that you can train any intelligent person to do anything, if you give him time and money.

Mr. REEVES. But it would require a considerable period of time to assemble the know-how and the mechanical skills to produce these mechanical timing elements?

General CAMPBELL. And money.

Mr. REEVES. To your knowledge, General Campbell, was that particular element in the mechanical time fuse produced by any other industry in the United States during World War II?

General CAMPBELL. The Bendix Aviation Co. is the only other one that I know of. They started back in 1938, as I recall that date, and I think that is very accurate, too, because I remember Vincent Bendix came down to Austin where I was with several of his people. And they had a rough time. We put men in their plants with the know-how, and we nursed them along. And finally, they got going. Afterwards, they did very well, which only bears out what I said that I can take anybody in this room, and if you give me money and time I will teach all of them how to make the mechanical time fuse.

Mr. REEVES. I hope that we will not have to learn.

General CAMPBELL. I hope not.

Mr. INGRAHAM. May I ask a question to refresh your mind. Bendix Aviation or the Eclipse Division of Bendix, did they actually produce any time fuses when Roy Hurley was there or at any other time, where they did not get the mechanical time parts for timing from the Ingraham Co., or from the horological industry—did they actually produce any of the plates or the timing themselves—did they assemble them—did they actually produce them?

General CAMPBELL. I would not want to say yes or no. I held up my hand a while ago. I do not remember.

Mr. REEVES. What was the volume of time fuses which the Frankfort Arsenal was producing in 1938, if you recall, on a daily output basis?

General CAMPBELL. It was very small, maybe three or four hundred a day, something of that sort.

Mr. REEVES. Based on your experience with this industry and the products which it produced during the war, with specific reference to mechanical time fuses, would you express your opinion as to the essentiality of the domestic timepiece industry, watch and clock industry to the national defense?

General CAMPBELL. Well, I would say this, knowing the military policy of this country and also knowing, as I do, the money that you do not get for this business when the skies are clear, I would say, having the watch and clock industry as a going industry, equipped with the necessary plants, the necessary know-how, the trained people, it is of very, very great value to this country as a backlog and a safety for a rapid reaching of production in that particular item.

Mr. REEVES. If an emergency were to occur, and the domestic timepiece industry, that is the watch and clock industry, were not in existence or were only vestigil in size, what would be the situation so far as our ability to produce the timing elements for mechanical time fuses?

General CAMPBELL. I think that it would be very, very serious, because, unfortunately, most and many of these machines which you people use, unless you have changed since I was in the business, are imported from Switzerland. And

how to get them over here in time of war, I would not know exactly, unless we have the airlanes and the sealanes all free. And also, how to get these people trained in a short time is a very essential thing.

Mr. REEVES. The mechanical time fuse continues to be the standard fuse in the ordnance now used by the services, does it not?

General CAMPBELL. As to type, yes. There are many, many different kinds of fuses, of course, but as to the type, that is a standard.

Mr. REEVES. Where you have a VT, or a radio fuse, is there some kind of a safety on that fuse which keeps it from arming prematurely and exploding prematurely?

General CAMPBELL. Oh, yes.

Mr. REEVES. What is the nature of that safety or control which is attached to the VT or radio fuse?

General CAMPBELL. That is a mechanical affair.

Mr. REEVES. That is a mechanical time control, is it not?

General CAMPBELL. That is correct.

Mr. REEVES. And so, essentially, with respect to a VT or the radio fuse, you have got the same timing element as the control for safety purposes that you have in a mechanical time fuse to make it explode at the right time, is that right, sir?

General CAMPBELL. In principle, yes.

Mr. REEVES. And, therefore, the same sources of timing elements for the mechanical time fuses would be required to produce the time control for the VT or the radio fuse?

General CAMPBELL. That is correct.

Mr. REEVES. General Campbell, I have no further questions. Thank you very much for your courtesy.

Mr. DONNELLY. General, when you speak of the watch and clock industry, do you include in that industry Hamilton, Elgin and Waltham Watch Cos.?

General CAMPBELL. I did not know that there was any more Waltham. I thought that it had gone out.

Mr. DONNELLY. It is quite active now, sir.

General CAMPBELL. I did not know that. Yes.

Mr. DONNELLY. Do you include Hamilton and Elgin Watch Cos.?

General CAMPBELL. Yes, indeed.

Mr. DONNELLY. When you refer to the watch and clock industry?

General CAMPBELL. Yes, indeed, very much so.

Mr. DONNELLY. In your remarks about the construction of the timing elements of the mechanical fuse and the safety device in the VT fuse, did Hamilton and Elgin participate in that work?

General CAMPBELL. Oh, yes, yes, indeed.

Mr. DONNELLY. That is all.

Mr. CENERAZZO. Did Waltham participate in your program?

General CAMPBELL. Yes, indeed.

Mr. CENERAZZO. Did you have charge of the procurement of "tach" watches, fighter control watches, et cetera?

General CAMPBELL. Yes, we bought a great many of those stopwatches, that sort of thing.

Mr. CENERAZZO. Were you able to get any of those from sources outside of this country during the war?

General CAMPBELL. I do not recall about that, sir. You see, I bought $50 billion worth of stuff during the war, and I do not remember much about the details.

Mr. CENERAZZO. What I wanted to know is, do you recollect whether or not there were importing groups with a source of supply during the war?

General CAMPBELL. I am afraid I cannot answer that under oath, no.

Mr. CENERAZZO. That is all.

Mr. LAZRUS. General Campbell, are you familiar with the fact, for instance, that Bulova and Benrus also participated in that program?

General CAMPBELL. Yes, indeed.

Mr. LAZRUS. Are you familiar with the fact that Gruen, at the present time, is participating in such a program?

General CAMPBELL. No, I am not. I am utterly out of touch with this at the present time.

Mr. FOX. General Campbell, are you also familiar with the fact that during World War II that there were a great number of companies, such as the National Cash Register Co., Eastman Kodak, the Edison Co., and so forth, that turned out countless millions of these mechanical time fuses?

General CAMPBELL. No, I did not.

Mr. REEVES. May I ask this question? There were 2 types of companies or 2 types of operations involved there, were there not—those that actually produced the timing elements, and those which assembled the complete fuse and procured the timing element from some other source?

General CAMPBELL. And still others which I think this gentlemen has reference to that made various parts and supplied you and the other people who were assembling them, I mean, the little pins and rivets, and what all.

Mr. REEVES. Many firms in the country, outside of the horological industry, could perform that particular operation?

General CAMPBELL. Yes.

Mr. REEVES. But only the limited group in the horological industry could produce the essential timing element for the fuse?

General CAMPBELL. They were the most satisfactory and the most successful, yes.

Mr. REEVES. And so some of the prime contracts for fuses involved the subcontracting of the procurement of the timing factor and other critical parts to the horological industry?

General CAMPBELL. That was one in the integration of all of these companies into one.

Mr. REEVES. Thank you, sir.

Mr. CENERAZZO. As the military man who has been in charge of Ordnance, do you feel that the country would be safe if the watch and clock industry, the manufacturers all became importers and had no standby organization to manufacture watches and clocks in this country—do you think this country would be safe in time of war?

General CAMPBELL. That is a rather academic question, my friend. You mean safe from whom?

Mr. CENERAZZO. Safe from the enemy.

General CAMPBELL. Well, we won every war up to the time we got the mechanical time fuse. We did not lose any of them.

Mr. CENERAZZO. Under modern warfare conditions, do you think it would be good to do without the things which the watch and clock industry, such as the synchronization of time and the synchronization of attack, that is necessary, the chronometers at sea and watches on your wrist?

General CAMPBELL. You are trying to get me to say something that I am not going to say.

Mr. CENERAZZO. Thank you.

Chairman BROSSARD. Are there any other questions of this witness? Thank you very much, General Campbell. We appreciate your testimony.

STATEMENT OF GEORGE W. FRAKER, GENERAL MANAGER, ORDNANCE DIVISION ELGIN NATIONAL WATCH CO.

My name is George W. Fraker and I am presently employed as general manager of the ordnance division of Elgin National Watch Co. I was a Reserve lieutenant in the United States Navy during World War II and was a technical procurement officer for the Bureau of Ordnance from February 1942, until December 1945. Among my responsibilities for the Bureau during this time was the procurement and technical direction of the Navy mechanical time fuse program and several other fuse programs.

Before entering the military service I was in the textile business in Philadelphia and employed by Cannon Mills. After the war, I returned to Cannon Mills, where I remained in an executive capacity until the Korean emergency. Because of my technical background in fuses, Mr. J. G. Shennan, the president of Elgin, employed me to assist Elgin in production of fuses and other military items. I joined the Elgin National Watch Co. in December 1950.

As a technical procurement officer in the fuse programs of World War II, I worked very closely with the various members of the watch and clock industries. The immediacy of the fuse requirements was such that the Bureau of Ordnance had to go directly to the sources which could produce fuses on a volume basis in the shortest time and the watch and clock industry was the best suited because of their day-to-day background knowledge of the highly technical problems involved. We did not have any engineers with sufficient training, background or experience in the Bureau, and it was fortunate for the fuse program that we were able to obtain the engineering assistance and guidance of the horological industry. During the war there were several crucial problems which developed in the mechanical time fuse and other programs and it was the various

members of the horological industry which found the solution for the Bureau. It was this industry's skills and know-how that enabled the Bureau to redesign and vastly improve the quality and performance of the original Junghans fuse. The horological industry was the guiding hand in the waterproofing, strengthening, improved timing and lubrication of the mechanical time fuse. Also, this industry, through their improved production technique, greatly reduced the cost of this time fuse and assisted on others.

The outstanding production accomplishments of the mechanical time fuse program could not have been made without the help and guidance of this vital industry. What the horological industry contributed to the mechanical time fuse program and many other programs in the Bureau of Ordnance is a matter of record and if those records are available, they would shed a great deal of light upon the subject of the committee's investigation.

At the close of the war a report was written by me as a part of my official duties which clearly showed the important part the watch and clock industry played in the ammunition program and their essentiality to the Bureau of Ordnance. This report was written from Section Pr 6 to Section Pr in the Bureau of Ordnance. I believe that it would be of great interest to your subcommittee.

Another fact of some significance is that the Bureau of Ordnance, in its mobilization planning, listed the various members of the watch and clock industry as key facilities so that at the start of the Korean emergency these companies were readily identified and were given production and development contracts on some of the most important time fusing devices we have to date.

HAGER & BRO., INC.,
Lancaster, Pa., June 18, 1954.

HON. JAMES H. DUFF,
United States Senate Building,
Washington, D. C.

DEAR SENATOR DUFF: Since you are serving as chairman of a Senate Preparedness Subcommittee which will hold hearings on the relation of the domestic watch industry to national defense, I thought you might be interested in a letter written by my brother to Senator Butler recently. Since I did not write this letter myself, I think I can say that it is a very good letter and it seems to hit the nail right on the head.

Naturally, Lancaster people are interested in the welfare of the Hamilton Watch Co. But the problem of national defense makes the welfare of Hamilton Watch Co. and other American watch companies a matter of paramount importance to everybody.

The American watch industries are certainly getting a lot of unfair competition from Swiss imports. We hope something can be done about it.

With kind personal regards,

Very truly yours,

NATHANIEL E. HAGER.

HAGER & BRO., INC.,
Lancaster, Pa., June 12, 1954.

HON. HUGH BUTLER,
United States Senate,
Washington, D. C.

MY DEAR SENATOR BUTLER: I was delighted to see in one of our local newspapers the report of your recent speech in the United States Senate denouncing the Swiss attempts to win public sympathy in their flight against increased watch tariffs. As a citizen of Lancaster, Pa., the home of the Hamilton watch, and as a stockholder in the Hamilton Watch Co., I will admit that I am prejudiced against the importation of Swiss watches. However, regardless of whether or not we think the Swiss are nice people, and that they deserve our sympathy, the fact remains that in two world wars their products were sold not to us but to our enemies. It may be that this is due to Switzerland's geographical location, and not to any fault of the Swiss people, but this does not change the situation.

Expert watchmakers cannot be trained overnight, and if the watch industry in this country is allowed to languish and die, it will be the equivalent of national suicide. If we cannot depend on Swiss imports in time of war, we certainly should not allow them to cripple our local watch industries in time of peace. Had it not been for the precision instruments turned out by Hamilton, Elgin, and Waltham during World War II, the United States Navy would now be

resting on the bottom of the Pacific, and our bomber fleets which destroyed the war potential of Japan, with no navigating instruments to guide them, would probably have never reached their objectives.

It is a great source of satisfaction to me that a man of your standing has taken up this matter which is of such great importance to our national welfare, and I hope that you will continue your efforts to remedy this situation. If we do sympathize with anybody, I think we should sympathize with American workers ahead of Swiss workers, but as I said before, regardless of whether we like the Swiss or not, the preservation of America's watch industry is not a matter of personal preference, but of national safety.

With all good wishes, I remain

Sincerely yours,

E. T. HAGER.

JUNE 21, 1954.

Hon. JAMES H. DUFF,
Chairman, Preparedness Subcommittee No. 6,
Senate Armed Services Committee,
Washington, D. C.

DEAR SENATOR DUFF: Over the past years, my experience in the mobilization problems of national defense insofar as the watch industry is concerned has convinced me this is an essential industry to meet national defense needs in any time of emergency.

I would appreciate consideration be given by the subcommittee to the enclosed statement of my experience during World War II as chairman of the Fuse Integrating Committee of the watch industry, relative to production of vital items for the war efforts.

Sincerely yours,

ROY T. HURLEY.

STATEMENT OF ROY T. HURLEY, CHAIRMAN OF THE BOARD AND PRESIDENT OF CURTISS-WRIGHT CORP.

In 1938 the Secretary of War called upon Mr. Vincent Bendix, the president of the Bendix Aviation Corp., and described to him a possible national emergency. In the event of war a requirement would be generated for some 40,000 antiaircraft fuses a day. These fuses had a watch type of movement, and War Department studies indicated that the available watchmakers in the United States would be able to produce only about one fourth of the requirements.

The fuse known as the Younghans type, had been obtained from Germany shortly after World War I. Some $8 million had been spent for educational orders with the watch industry prior to 1938 in order to prepare the industry for the war production of these fuses. The result of these educational orders was to highlight the shortage of the skill and equipment necessary to produce sufficient fuses for full mobilization.

Pursuant to the request of the Secretary of War, Mr. Bendix assigned me to the job of studying the problem and finding a solution. My studies resulted in a decision that Bendix accept an order for 200,000 fuses to be made at the Eclipse Machine Division of the Bendix Aviation Corp. at Elmira, N. Y. Furthermore, this division of Bendix would subcontract to the watch industry in order to obtain essential parts such as, wheels, gears, pinions, escapements, plates, etc. The fuses were contracted for at the very low price of $6 each. This low price had the effect of compelling the company to find the solution to the production problem or lose money.

This contract was successfully completed just as war mobilization began. The techniques used in production of the fuses under this contract were made available to all antiaircraft fuse manufacturers via the Ordnance Mechanical Time Fuse Integrating Committee. It was my privilege to serve as chairman of this committee. Due to our efforts and the fine cooperation of the watch and clock industry as members of same committee, all the required fuses were produced and cost to the Government was substantially reduced.

I am proud to quote a Distinguished Service Certificate presented to me by the Ordnance Department for this effort:

"For exceptionally meritorious conduct in the performance of outstanding services as consultant to the Army Ordnance Department. He successfully developed, organized and inspired the 'Industry Integration Committees.' His untiring efforts resulted in savings of millions of dollars and for his Government and in

advancing by months the time within which many critically needed ordnance items could be made available to United Nations fighting troops.

"L. H. CAMPBELL, Jr.,
Lieutenant General, Chief of Ordnance.

"AUGUST 14, 1945."

This experience, I believe, qualifies me and I do not hesitate to make the following statement: I do not believe we would have produced the required quantity and quality of mechanical time fuses if it were not for the American watch and clock manufacturers.

There is no question that their skill and help will be required for national security if we again engage in a major war. Considering the weapons available today and the fact that war can take place anywhere in the world in a matter of hours, we must have a strong watch and clock manufacturing industry as an essential part of our industry-defense team.

I cannot conceive of this country being dependent upon overseas sources of supply for watches, clocks, jewel bearings, or precision time mechanisms in the event of war. However, I do not recommend that we shut out foreign manufacturers completely. I recognize full well that we must help and cooperate with our neighbors and good friends throughout the world. On the other hand, I do recommend, Senator, that the Congress grant sufficient protection to the American watch and clock industry to be sure that it will be not only a strong industry, but that its highly developed skills and techniques will be preserved for the use of this country.

In my judgment, preservation of the watch industry is essential in order to meet the requirements of any emergency which might develop in the future.

DEPARTMENT OF THE NAVY,
BUREAU OF ORDNANCE,
Washington 25, D. C., March 19, 1954.

From: Chief, Bureau of Ordnance
To: Chief of Naval Material
Subject: The jeweled watch industry

1. The American jeweled watch industry consists principally of four companies, viz Elgin, Hamilton, Bulova, and Waltham. These companies presently manufacture watch movements in this country in competition with imported watch movements which are cased and sold by such companies as Omega, Benrus, Gruen, and Longine. The jeweled watch industry itself imports movements on the following percentage of their total production—Bulova 80 percent, Elgin, Hamilton, and Waltham about 20 percent.

2. The jeweled watch industry is in an unfavorable position as compared with importers of watch movements because of the labor differential and because of a lack of an import duty sufficient to offset the labor cost. The effect of this unfavorable position is inevitable and eventually will force this industry into the import business exclusively.

3. This same situation has existed since the end of World War II, and in 1952 was the subject of a study by the Department of Labor and by an interdepartmental committee established by the Chairman of the National Securities Resources Board, which reports were forwarded to the President on January 8, 1953. No action of benefit to the American industry ensued as a result of these reports.

4. It is the understanding of this Bureau that this subject is again under consideration with the same object in view.

5. While the jeweled watch industry per se is not the only source of watch and clock-type movements necessary to the national defense, it is nevertheless considered to be extremely essential in this field in view of its know-how and its ability to make certain essential parts required by the watch and clock industry in general.

6. The following is a brief résumé of the Bureau of Ordnance M-day requirements for items requiring watch and clock type mechanisms:

Rocket fuses (quantity deleted for security reasons)
VT fuses (quantity deleted for security reasons)

In addition to these requirements are those of the Army and Navy for mechanical time fuses which would probably equal or exceed the VT fuse requirements. From these figures, it is this Bureau's opinion that insufficient capacity already

exists in the watch and clock industry, including the jeweled watch industry, to meet the national defense M-day requirements and that we should take whatever steps are appropriate to so inform higher authority.

7. It is therefore recommended that representatives of the Office of Naval Material be fully appraised of this situation in order that higher authority may be in possession of all the facts as to the esentiality of the watch and clock industry, no small part of which is known as the jeweled watch industry.

M. F. SCHOEFFEL.

HIGHLAND PARK, ILL.

FRED B. RHODES,
Chief Counsel, Senate Preparedness Subcommittee No. 6,
Senate Office Building, Washington, D. C.:

As former head of VT fuse program, United States Navy, Bureau Ordnance, 1950–52, wish to express views of essential usefulness and program performance of Bulova, Elgin, and Hamilton Watch Cos. Actual on the scene knowledge of contract dates and delivery dates are essential to any evaluation. Elgin delivered in 6 months; Hamilton and Bulova in 8. Also all three companies made parts for the other two companies. Prices were lower and quality better also less engineering changes were requested by these three. If my personal detailed account of the fuse program as well as World War II and interim experience would help committee strongly urge personal interview in Washington at your convenience.

J. H. GICHNER,
Commander, USNR, 4301 Massachusetts Avenue NW., Washington, D. C.

STATEMENT OF ROBERT LARSEN

I. LA FEDERATION SUISSE DES ASSOCIATIONS DE FABRICANTS D'HORLOGERIE

A. Background

Since the middle 1930's the Swiss watch industry has been operated on a monopolistic basis by the organization called La Federation Suisse Des Associations de Fabricants D'Horlogerie, which in effect is the cartel of the Swiss watch industry.

B. General structure

(1) Fabricants d'Horlogerie: Assemblers of watches which are ultimately exported (over 50 percent going to the United States).

(2) Ebauches S. A.[1]: Manufacturers of "ebauches" or raw movements without escape parts.

(3) Union Branches Annexes Horlogeries (UBAH): Association of suppliers of parts, such as dials, hands, escape parts, mainsprings, jewels, etc.

C. Method of operation

(1) All of these groups are interlocked; that is, a buyer of watch parts must be certified as having obtained the "ebauches" or raw movements from the Ebauches S. A. Vice versa, the buyer of "ebauches" must obtain parts from the UBAH.

(2) The federation is organized for mutual protection, and its prices are strictly regulated by the Department d'Economie Publique, at Berne, which is an arm of the law.

(3) The Department d'Economie Publique also has control over the exportation of tools, implements, instruments, and machinery that may make possible the transplanting of the watch manufacturing industry abroad. The exportation of dies, plans, or machines directly connected with the watch industry is strictly prohibited.

II. REPLACEMENT PARTS FOR WATCH REPAIRS

A. Regulations governing watch parts

(1) The exportation of watch parts from Switzerland to the United States is regulated by law, which specifies that the parts are to be used for repair purposes only.

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[1] Although it may appear that Ebauches S. A. is only one of the constituent parts of La Federation Suisse des Associations de Fabricants d'Horlogerie, actually it is the prime power behind the entire federation and virtually controls the operation of the entire Swiss watch industry. Ebauches S. A. works very closely with the Horological Department of the Department d'Economie Publique.

(2) American importers of these parts must satisfy the Swiss authorities that the parts they import will not be used for any other purpose.

B. Availability of watch parts in the United States

(1) Ebauches S. A. has opened sales offices in New York for the purpose of monopolizing the sale of these parts to a limited group of distributors, and to make certain that these parts will be used for replacement purposes only.

III. JEWELS AND JEWEL BEARINGS

A. Sources of supply for the United States

The United States manufacturers of watches and precision instruments are almost entirely dependent upon imports for their jewel requirements. Annual imports average over 100 million pieces, of which by far the largest portion comes from Switzerland.

B. Recognition of dependence of the United States

This dependence of the United States upon foreign sources for jewels and jewel bearings is illustrated by the following clause included in contracts issued by the procurement departments of the United States armed services:

"All material to be supplied under any contract resulting from this request for proposal must be genuine parts and of American manufacture.

"American manufacture is defined to mean that not more than 2½ percent by dollar value, of the parts (exclusive of jewels) being supplied are of foreign manufacture.

"Each bidder must certify to the foregoing and indicate the percentage of parts (exclusive of jewels) which are of foreign manufacture."

C. Jewel manufacturing attempts in the United States

It is a known fact that during World War II the defense authorities encountered tremendous difficulty in satisfying their requirements for jewels. A jewel manufacturing industry was started in this country at great cost and with much effort; but this industry was practically abandoned as soon as the war ended and Switzerland was again able to supply jewels and jewel bearings.

D. Outlook for independent jewel manufacturing in the United States

The modern tools and machines and the latest technical methods used in Switzerland at the present time make it impractical for the United States to produce jewels in competition with Switzerland.

E. Conclusion

The net result is that in respect to its requirements for this strategic article, the United States remains in an exceedingly vulnerable position because of its dependence on foreign sources of supply.

ROBERT LARSEN.

NAVY DEPARTMENT, UNITED STATES NAVAL OBSERVATORY,
Washington, D. C., June 26, 1940.

MY DEAR SIRS: Some months ago, appreciating the growing advisability of obtaining a surplus stock of chronometers, the Naval Observatory submitted proposals for the manufacture of over 100 chronometers.

Not a single American firm submitted a bid. Therefore the contracts for the construction of these chronometers had to be made with a British firm and a Swiss firm.

When one considers the rapidity with which international relations change, this failure on the part of the watchmakers of America to show any interest in the development of chronometers has developed a very serious situation.

Of the chronometers on order abroad, so far the British have delivered only 13, plus the 1 held here as sample; and the Swiss company has delivered none of the 62 on order. In other words, there are 87 chronometers on order which have not yet been delivered and which may or may not be delivered due to the situation abroad.

As patriotic American citizens, I appeal to you all to do your part in this very important step toward national preparedness.

Very sincerely yours,

J. F. HELLWEG,
Captain, United States Navy (retired),
Superintendent.

AUGUST 20, 1940.

Subject: Ships' Chronometers for the Navy

Lt. Comdr. T. O. Brandon called at the factory August 19 at 3 p. m. in connection with the letter of June 26 from Capt. J. F. Hellweg asking about the manufacture of chronometers. Lieutenant Commander Brandon stated that the Navy was anxious to obtain approximately 500 ships' chronometers for the vessels which would be built during the next 3 years. The delivery of these instruments should start within a year and be completed within 3 years. There would be around a quarter million dollars involved in this transaction as the Navy pays between $450 and $500 for chronometers.

Lieutenant Commander Brandon stated if the Navy could not get manufacturers to make this equipment that they would buy the parts and assemble them themselves. They have about 10 men who are experienced in adjusting chronometers and figure they would have to turn out 4 chronometers a week, which would require 4 to 8 men, depending upon how much adjusting was required with these instruments.

He wanted to know whether we would be ready to make instruments for them, what it would cost and how soon deliveries could be made, or if we could not make the complete chronometers here, whether we could make the parts for them to assemble and what it would cost, and how long it would take to make complete drawings of a chronometer so that they could use these drawings to go out and purchase parts. We discussed the question of jewels and fusee chains and Lieutenant Commander Brandon said the Navy would like to have everything made in this country. He thought maybe Elgin could make the jewels and Bendix the fusee chains, in case we were not in a position to make them. The Navy is now using a Nardine chronometer and would like to have that instrument duplicated. Lieutenant Commander Brandon was told if he would let us have a chronometer, we would look it over and let him know what it would cost to make drawings and complete instruments.

Lieutenant Commander Brandon also brought up the subject of patrol boat watches and wondered whether we would be in a position to make these for the smaller boats that would not carry chronometers. The total quantity of patrol boat watches required would probably be around 5,000. He was told that we had no drawings or tools for the manufacture of this watch and would have to start from the beginning so that it would probably be a year and a half or longer before the Navy could expect to get these patrol boat or deck watches.

At twenty minutes to five, Lieutenant Commander Brandon was taken for a short walk through the factory in the plate, train, automatic, heat treating and through the assembly departments. He also met and discussed the Navy requirements with Mr. Atkinson and Mr. Smith and was then shown through the engineering division by Mr. Manby.

In connection with work of this type for the Government, it should be remembered at all times that we have in the neighborhood of 1,700 people to keep employed and that special jobs for the Government that only employ our engineering staff are apt to disrupt the organization and not give work to the majority of our employees. This fact was mentioned in the discussion with Lieutenant Commander Brandon as probably one reason why it was difficult to get people interested in specialty work, such as chronometers, and in going through the factory it was pointed out to him that all of our production machinery was designed to make watches from a small size up to a 16–S pocket watch, that we had no equipment and machinery for the production of larger size timekeeping instruments.

In connection with many of the questions which were asked by Lieutenant Commander Brandon, it was quite apparent that he was more or less intrigued with the idea of making chronometers at the Naval Observatory and was trying to find out just what floor space, equipment, etc., would be needed for the job.

NOVEMBER 5, 1940.

To: G. P. Luckey, vice president in charge of manufacturing.
From: M. F. Manby, chief engineer.

This morning I phoned to Lieutenant Commander Brandon, Naval Observatory, and told him that we received a Nardin ship chronometer from the inspector of naval material, Mr. H. B. McCorkle, and asked if he knew anything about the shipment of this chronometer. He replied that several days ago he received a request from Commander Mather, equipage officer at the Naval Observatory, to send a new Nardin ship chronometer to the Hamilton Watch Co. as soon as pos-

sible. From this request, he thought that Hamilton was interested in following through with their original intentions of estimating cost of manufacturing ship chronometers.

The only change in the picture at the present time as compared to that which he outlined to us on August 20, is that it has been definitely decided that the Naval Observatory will not go through with their plans to purchase ship chronometer parts and assemble them at the Observatory. He said as far as he knows, deliveries of Nardin ship chronometers are coming through regularly and that evidently it will only be necessary to manufacture ship chronometers in this country in case war is declared.

I asked him whether he thought it advisable for us to go ahead with our plans to make an estimate of the cost of making complete detail drawings of the Nardin ship chronometer and estimate cost of tools, as well as an estimate of cost to manufacture in quantities of 500 for a 3-year period. He said he thought that would be valuable data to have on hand from a planning angle, but he had no authority to authorize us to proceed with this phase of the work.

NOVEMBER 6, 1940.

To: G. P. Luckey, vice president in charge of manufacturing.
From: M. F. Manby, chief engineer.

In a conversation with Commander Mather, equipage officer at Naval Observatory, this morning it appears that the only reason the Nardin ship chronometer was sent to us was the result of a notation he made several months ago that Hamilton would like to see a new Nardin ship chronometer when one arrived from Switzerland. Commander Mather said that the situation, as far as ship chronometers are concerned, is very much improved.

The Navy has received and expects to receive regular shipments of chronometers from Switzerland and England, and he said that his recommendations to reduce the requirements from 3 to 1 for capital ships has been approved. He said that normal requirements for the next 4 or 5 years would be in the neighborhood of 40 new chronometers per year, and that ship chronometers now cost them from $325 to $450, with the English-made chronometers the most expensive.

I asked whether it was their intention to have someone in America tool up to manufacture chronometers and he said that he knew of no plans for such procedure, unless an emergency existed. I told him that at least 4 or 5 months would be required to make complete detail drawings, i. e., an exact copy of a Nardin ship chronometer or any make that they might designate; and for a quantity as small as 40 per year they would have to be manufactured on a job-shop basis and roughly cost in the neighborhood of $800 to $900 a piece. He said he expected to attend a conference of the Planning Board at the Navy Department this afternoon and would again bring up the subject in light of the present situation. He told us to keep the Nardin chronometer until we hear from him further, and to do nothing definite in the way of preparing drawings or starting construction of ship chronometers until we hear from him.

I suggested that as long as an emergency does not exist at the present time, it might be advisable for the Government to employ us on a no-priority basis to make a complete set of detail drawings of a Nardin chronometer, so that the Government would have them available at such a time as there might be an emergency. I roughly estimated to him that at least 4 or 5 months elapsed time would be required to make complete workable detail drawings, and it would probably only cost the Government in the neighborhood of $2,000 or $3,000 to purchase a complete set of such engineering data. I explained to him that this estimate was very tentative and if he wished us to make a further and more exact estimate we would be glad to do so.

Commander Mather told us to do nothing until we hear from him and said he would write to us in the next few days on this subject.

NAVY DEPARTMENT,
BUREAU OF SHIPS.
Washington, D. C., November 15, 1940.

Mr. M. F. MANBY,
Hamilton Watch Co., Lancaster, Pa.

DEAR SIR: In accordance with recent telephone conversation, you are advised that subject to approval of tentative recommendations, it is believed that the Navy will be in the market for about 75 to 100 chronometers over the next 2 or 3 years.

As soon as requirements have been definitely determined, you will be communicated with again to ascertain whether the Hamilton Watch Co. desires to enter this field.

Thanking you for your interest, believe me to be,

Very truly yours,

P. L. MATHER,
Commander, United States Navy.

NOVEMBER 22, 1940.

Comdr. P. L. MATHER,
Naval Observatory, United States Navy Department,
Washington, D. C.

DEAR COMMANDER MATHER: Your letter of November 15, 1940, received and greatly appreciated.

Since it looks as though the Navy will have all the ship chronometers they need for the present, the thought occurred that now is the time to prepare for future requirements by accumulating all available data so that the minimum time will be required to get into production in case of an emergency.

It is suggested that it might be advisable, as a war planning measure, to establish a project to make a complete set of detailed and assembly drawings of one of the best chronometers used by the Navy. These drawings would be United States Government property and stored away until the time when it becomes necessary to manufacture them in the United States. By having complete detailed drawings with carefully engineered manufacturing tolerances at least 8 to 10 months could be saved between the time when the Navy actually decides they need domestic chronometers and the first chronometer could be produced. Drawings would be a great aid to expedite production.

We estimate that one good draftsman experienced in design of accurate timekeeping mechanisms could complete the job in 8 to 10 months. If drawings without dimensional manufacturing tolerances are all that would be required, the job could be completed in about 6 months by one man. Two or three draftsmen could, of course, complete the job in much less time. In any case it should not cost the Government any more than $3,000 for a complete job.

We have three draftsmen between the ages of 21 and 35 who are capable of doing a job of this kind. If you think well of this suggestion your advice on procedure necessary to establish a project of this kind before they are called to service will be to the best interest of the Government.

Sincerely yours,

HAMILTON WATCH CO.,
——— ———, *Chief Engineer.*

NAVY DEPARTMENT,
BUREAU OF SHIPS,
Washington, D. C.

HAMILTON WATCH CO.,
Lancaster, Pa.

(Attention: Mr. M. F. Manby, Chief Engineer.)

MY DEAR MR. MANBY: Receipt is acknowledged of your letter of November 22, wherein you suggest the desirability, as a war planning measure, of making a complete set of detailed and assembly drawings of a chronometer in use in the Navy.

This proposition has met with approval and the Bureau proposes, in the very near future, to initiate a requisition covering the project of making the complete set of the detailed and assembly drawings of a Nardin chronometer. As suggested, it is the Bureau's desire to have complete detailed drawings with carefully engineered manufacturing tolerances.

The Bureau notes with approval the fact that you have a draftsman, or draftsmen, available to undertake this project, and the fact that it can be completed within 6 to 8 months at a cost not to exceed $3,000.

Thanking you for your patriotic interest as manifested by your helpful suggestion, believe me to be

Cordially yours,

By direction:

P. L. MATHER.

MAY 22, 1941.

Mr. R. B. THOMPSON, *Comptroller.*
Mr. M. F. MANBY, *Chief Engineer.*

When visiting the Naval Observatory, Monday, May 19, 1941, Lt. Comdr. C. V. Lee, equipage officer for Bureau of Ships, said that they would like to order another 125 marine chronometers, or in other words, they wanted to exercise 100 percent of the 300 percent option. They were, however, concerned about deliveries and asked whether we could start delivering them by August 1942 at the rate of five per month, and continue at the same rate as the first 125.

I told him that I believe we would have no difficulty in planning for such a schedule and he asked me to confirm this by letter addressed to his attention, with an extra copy so that he could attach it to his requisition which he must place with Bureau of Supplies and Accounts.

Our schedule would then be as follows:

	1st 125	2d 125		1st 125	2d 125
May 1942	5		March 1943	10	10
June 1942	5		April 1943	10	10
July 1942	5		May 1943	10	10
August 1942	5	5	June 1943	10	10
September 1942	5	5	July 1943	10	10
October 1942	5	5	August 1943	10	10
November 1942	5	5	September 1943		10
December 1942	10	5	October 1943		10
January 1943	10	5	November 1943		10
February 1943	10	5			

Since you have handled the previous correspondence concerning prices and deliveries, will you please write and confirm the delivery estimate for the second lot of 125, should they wish to take advantage of part of the option at this date.

NAVY DEPARTMENT,
UNITED STATES NAVAL OBSERVATORY,
Washington, D. C., April 1, 1942.

Mr. M. F. MANBY,
The Hamilton Watch Co., Lancaster, Pa.

MY DEAR MR. MANBY: Thanks very much for your letter of the 30th, and particularly the third paragraph.

I would certainly like to report this to the Navy Department, but there are so darned many screwballs cruising around loose in the Department that I am afraid some one of them might mention the fact in the hearing of some correspondent and the next thing we knew, the whole thing would be in some feature section of some Sunday paper. Therefore, we will have to hide your light under a barrel for some time to come.

I certainly hope that the Hamilton Watch Co. will be able to deliver chronometers at high enough rate of speed so that we will not have to buy any chronometers abroad. In other words, that you will be able to handle the entire demand for all the ships which will be put in commission in the future. That is a big order, and even if they are more expensive than the ones we could get abroad, the fact that it makes us independent of a foreign market that any time may be completely closed is of sufficient importance to carry great weight in all decisions.

In reply to your second paragraph, any arrangements that are satisfactory to your company and that will not interfere with the delivery of watches to the flyers will be entirely satisfactory to me. Whenever you are ready to deliver the watches, please let me know.

Very sincerely yours,

J. F. HELLWEG,
Captain, USN (Ret.), Superintendent.

NAVY DEPARTMENT,
UNITED STATES NAVAL OBSERVATORY,
Washington, D. C., April 9, 1942.

Mr. M. MANBY,
Hamilton Watch Co., Lancaster, Pa.

MY DEAR MR. MANBY: Your letter of April 3, enclosing a copy of a letter received from William Bond & Son, is acknowledged. Needless to say, it has been read with considerable interest. I do not believe that at that early date anybody in the United States was in a position to make a chronometer. Bond may have obtained some parts from Europe and may have assembled them, but I feel morally certain that nobody in this country, in 1812, was equipped to complete a chronometer.

I have requested the Bond company to furnish me with documentary evidence to sustain such a statement.

I believe that the two chronometers recently brought here by you will be found to be the first chronometers ever made in the United States, and also I feel sure that they will be the first chronometers ever made of all material of domestic manufacture—and that is something which should be recorded. As soon as this question is thoroughly threshed out, I shall make a certified report to your company, as I believe you should get the credit for one of the most important aids to the present war.

I cannot give you any report concerning the Bond company which would aid you in the subject referred to in your third paragraph. Unless you allow them to use your new material in the manufacture of parts, I do not believe that if they manufacture parts of other material that they will be equally efficient, and I would therefore recommend that you go very slowly before you start subletting contracts to some other firm to make parts which I think you will be able to make better. Of course, you may determine that this is not so and you may be able to expedite your deliveries if you have some parts made by subcontract, but, for heaven's sake, be careful and do not spoil your chronometers by the introduction of any parts which later might prove unsatisfactory; or, if not unsatisfactory, not as efficient as your own parts. You have a bigger stake in the reputation of your chronometers than any subcontractor might have.

Very sincerely yours,

J. F. HELLWEG,
Captain, USN (Ret.), Superintendent.

HAMILTON WATCH CO.,
Lancaster, Pa., June 2, 1942.

Comdr. E. B. OLIVER,
United States Naval Observatory,
Washington, D. C.

Re your letter May 29, 1942, to M. F. Manby, re extension of contract NOs–85310

DEAR COMMANDER OLIVER: With reference to the proposed extension of contract NOs–85310 to procure an additional 1,500 standard marine chronometers, we can make delivery of this quantity according to the following schedule:

Subject extension of contract NOs–85310

Deliveries in month of—		Deliveries in month of—	
June 1943	50	February 1944	100
July 1943	50	March 1944	100
August 1943	50	April 1944	100
September 1943	100	May 1944	150
October 1943	100	June 1944	400
November 1943	100		
December 1943	100	Total	1,500
January 1944	100		

We are currently scheduled to deliver 250 standard marine chronometers under previous commitments during each month of the above-proposed delivery schedule, up to May 1944, when the quantity drops to 200 units, completing deliveries of all chronometers now on order with us.

Should we secure the subject extension, you will note that we propose to make deliveries concurrently with our existing commitments, up to June 1944, when the delivery of the final 400 chronometers under the subject extension will complete all chronometer orders now placed and proposed.

The complete delivery picture follows:

Total of all current commitments including subject extension

Deliveries in month of—		Deliveries in month of—	
April 1942	7	July 1943	300
May 1942	40	August 1943	300
June 1942	30	September 1943	350
July 1942	40	October 1943	350
August 1942	50	November 1943	350
September 1942	50	December 1943	350
October 1942	60	January 1944	350
November 1942	60	February 1944	350
December 1942	100	March 1944	350
January 1943	100	April 1944	350
February 1943	100	May 1944	350
March 1943	250	June 1944	400
April 1943	250		
May 1943	250	Total	5,837
June 1943	300		

Should we secure the proposed extension of 1,500 chronometers and the above-accumulated delivery schedule thereupon become effective, we will have completely exhausted our productive capacity on standard marine chronometers for the period covered. Any future commitments on this item would have to be based upon deliveries starting in June 1944. However, should we find that the use of quantity-production tools facilitates production above our present expectations, we will notify you promptly.

We are pleased to quote a price of $507.50 each on the standard marine chronometers which are to be procured under the subject extension of contract NOs–85310, or a total of $761,250 for the entire quantity of 1,500 units. All terms and conditions are identical with those of the original contract.

Very truly yours,

_____,
Supervisor, War Contracts Division.

NAVY DEPARTMENT,
BUREAU OF SHIPS,
Washington, D. C., January 17, 1943.

HAMILTON WATCH CO.,
Lancaster, Pa.

GENTLEMEN: The number of secondhand chronometers available is very low. The increasing demand by the United States Navy and the Maritime Commission, plus the demands from the United Kingdom for chronometers, have critically depleted the supply of chronometers in stock. It is impossible to overemphasize the urgent necessity of immediate mass production of chronometers by your company.

It is requested that every effort be made to complete tooling for mass production at the earliest possible date.

To facilitate allocation of chronometers for 1943, it is requested that you furnish this Bureau with your estimate of the time it will take you to complete mass-production tooling and the number of chronometers which you expect to deliver during 1943.

Your company is now delinquent 86 standard chronometers on your contract NOs–85310 with the Navy.

Yours very truly,

By direction of Chief of Bureau:

D. C. KERR.

MARCH 17, 1943.

NAVY DEPARTMENT, BUREAU OF SHIPS,
Washington, D. C.

Subject: Contract No. NOs–85310—Chronometers, ships.
(Attention: Mr. George H. Coates, room T–3–2000.)

DEAR SIR: We submit herewith our bid covering an additional quantity of 3,000 chronometers, ships, for inclusion as an extension of the subject contract.

These chronometers are to be supplied in accordance with specification No. 18–C–7d except that the hairspring shall be made of Elinvar alloy and the balance made of a combination of Invar and stainless steel, but with the chronometers completely adjusted before delivery. Our quotation for these chronometers is $390 per unit, or a total of $1,170,000 for the 3,000 units covered by this procurement. This price includes delivery to the Naval Observatory, Washington, D. C., by means of our own transportation equipment.

If awarded this additional procurement, we plan to increase our delivery rate to 500 units per month, starting February 1944 and to continue at that rate until deliveries under the contract are completed. The estimated completion date for the subject contract would then be January 1945. Every effort will be made to increase the delivery rate to 500 units per month prior to February 1944.

If awarded this additional quantity of 3,000 units, we can reduce the price of 5,565 chronometer units due under the subject contract from $507.50 per unit to $390 per unit. This would represent a reduction of $653,887.50 in the contract amount.

Our detailed price analysis covering this negotiation is enclosed herewith in triplicate.

Very truly yours,

HAMILTON WATCH CO.,
_____ _____,
Comptroller.

NAVY DEPARTMENT,
BUREAU OF SHIPS,
Washington, D. C., May 5, 1943.

HAMILTON WATCH CO.,
Lancaster, Pa.

DEAR SIRS: In order to insure the production of chronometers necessary for the war effort, the Bureau is entering into a contract with the Elgin Watch Co. of Elgin, Ill., for the manufacture of 3,000 marine chronometers. As indicated in a conference between Commander Oliver of this Bureau and Mr. Kant of your company, the Bureau has requested and will greatly appreciate your company giving its assistance to the Elgin Watch Co. in its performance of the aforementioned contract.

Specifically, the Bureau desires and requests that your company furnish the Elgin Watch Co. with the drawings for the Hamilton marine chronometer and drawings for the tools necessary for the production of the various parts of such chronometer. It is further hoped that the engineers of your company may from time to time be able to provide assistance to the engineers of the Elgin Watch Co.

It is felt that your cooperation in the manner above requested will materially decrease the time required by Elgin to get into production, early production by Elgin being regarded of great importance by the Bureau.

Very truly yours,
By direction of Chief of Bureau:

N. W. GOKEY.

NAVY DEPARTMENT,
UNITED STATES NAVAL OBSERVATORY,
Washington, D. C., October 21, 1944.

MR. GEORGE P. LUCKEY,
Vice President in Charge of Manufacturing,
Hamilton Watch Co., Lancaster, Pa.

DEAR MR. LUCKEY: Mr. C. Jowsey, chief superintendent of the British Hydrographic Supplies Establishment, is visiting this country in connection with a survey of the existing facilities and development of hydrographic and navigational instruments. He has a strong personal interest in chronometers in that these instruments are under his cognizance in the British Hydrographic Office. During a visit to the Naval Observatory, he was delighted to see the world's

first mass production chronometer, the Hamilton. His pleasure in noting its fine workmanship and performance record was unfeigned.

Mr. Jowsey's interest in observing how during war America had maintained the high standards requisite in a fully serviceable chronometer evinced a desire to visit the Hamilton plant and discuss chronometers with you.

With best personal regards,

Sincerely yours,

T. O. BRANDON,
Commander, United States, Navy,
Material Officer.

NAVY DEPARTMENT,
UNITED STATES NAVAL OBSERVATORY,
Washington, D. C., March 21, 1945.

Mr. W. R. ATKINSON,
Vice President in Charge of Sales,
Hamilton Watch Co., Lancaster, Pa.

DEAR MR. ATKINSON: Thank you for your kind esteem and good wishes. We always enjoyed your all-too-few visits to the Naval Observatory and looked forward to them. Our contacts with you and other Hamilton representatives were invariably interesting and stimulating. I will miss them.

Your company has done a magnificent and unprecedented job on the marine chronometer. The instrument today is superior in most respects to the world's finest, which latter took many years to evolve. The personnel here have a modest pride in the solid satisfaction which is justifiably yours in reviewing an extremely difficult task well done.

The vessels of our Navy are in good hands when navigated by the use of Hamilton's timepieces.

With kindest personal regards,

Sincerely yours,

T. O. BRANDON,
Commander, United States Navy.

ARMY AIR FORCES, MATERIEL CENTER,
Wright Field, Dayton, Ohio, October 23, 1942.

Subject: Loss of skilled labor.
To: Hamilton Watch Co., Lancaster, Pa.
Attention: Mr. Calvin M. Kendig, president

1. The attention of this center has been drawn to the critical employment situation facing the watch industry in this country during the period of conversion to the 100 percent use of its production facilities and capacity for war work. Plants which, for example, are currently employing 86 percent of their employees on warwork have been, or shortly will be, required by the War Production Board to discontinue all non-warwork, and thereby lose 14 percent of their trained workers. If the tooling program on aircraft instruments and other war material had been completed, it is assumed that this remaining 14 percent of employees would have been wholly absorbed in actual production work on highly essential war materiel.

2. At the request of one of the larger watch companies, the Army Air Forces have presented this problem to the War Production Board, with the proposal that this condition be relieved by permitting the watch companies to continue manufacturing civilian watches a little longer. Assurance has been given that the Army Air Forces will make every effort to see that tooling programs on aircraft instruments are completed promptly, in order that the employees can be transferred to warwork as soon as possible.

3. The War Production Board will call a meeting of the Standard Production Committee with a view to eliminating this problem of protecting the watch industry against the loss of its skilled help. They further advise that War Production Board has asked for positive assurance that every effort will be made to complete the tooling programs on aircraft instrument contracts as early as possible, and that the War Department has assured War Production Board this will be done.

4. The purpose of this letter, therefore, is to request the fullest cooperation of your company, and all other companies in the industry, toward the prompt and successful achievement of this end. If there are specific problems incident

to this matter on which clarification is required, your inquiry may be addressed to this center, attention: Chief, Aeronautical Equipment Branch, Production Engineering Section

For the commanding general, Army Air Forces, Materiel Center:

S. R. BRENTWALL, *Colonel.*
(For) K. B. WOLFE,
Brigadier General, United States Army, Chief, Production Division.

OCTOBER 27, 1942.

Reference: REM: 1b–70–5—Your letter dated October 23, 1942.

COMMANDING GENERAL,
Material Center, Wright Field, Dayton, Ohio.

(Attention: Chief, Aeronautical Equipment Branch, Production Engineering Section.)

GENTLEMEN: The employment situation in the American watch industry is very accurately presented in your letter dated October 23, 1942, and we want to assure you of our full and sincere cooperation.

We have on numerous occasions brought this situation to the attention of the War Production Board, and have also familiarized various branches of the United States Armed Forces with our position, which is similar to that of the other American watch manufacturers.

For your information, the past history and present position of the Hamilton Watch Co. with respect to 100 percent conversion to warwork, is very briefly, as follows:

We were assigned the task of designing, engineering and producing the most precise timekeeping instruments involved in the war program—such items as marine chronometers, chronometer watches, chronograph stop watches, elapsed time clocks, and master navigation watches. Many of these instruments have never before been made in this country; all of them involve engineering, design and toolmaking programs which, for a company Hamilton's size, are extremely heavy.

We have achieved fair but so far inadequate production on master navigation watches; a very limited production is just starting on marine chronometers; initial deliveries of chronometer watches were made in June 1942; the chronograph stop watch is in its final tooling stage; the elapsed time clock is not yet off the drawing board. An average of 8 months is required to manufacture instruments of this type, and while we are virtually 100 percent converted to warwork in the originating manufacturing operations, the flow of warwork through our factory will not reach the assembly and finishing operations in sufficient volume to fully engage these employees until February or March 1943.

The workers in the assembly and finishing departments are the most highly skilled in our factory. Our present force is now approximately 85 percent occupied on war work, but is not large enough to handle the war peak which will arrive in these departments next year. The staff of finishers and assemblers must be supplemented by the training program we now have operating. Our war production will suffer seriously, perhaps dangerously, if we are not able to hold this highly skilled group of employees. The only solution appears to be a small continuing production of civilian watches until, say, March 1, 1943, when 100-percent conversion will automatically follow.

When conservation order M–9–c became effective on June 15, 1942, the War Production Board granted the Hamilton Watch Co. a 90-day extension in which to manufacture 100,000 civilian watches, which represented approximately our normal production capacity on our regular line of timepieces. We were subsequently granted a further extension to November 16, 1942, and by the end of the 6-month period we estimate that we shall have remaining for final assembly and finishing approximately 26,000 out of the original 100,000 watches.

The policy we have been following on civilian production is thus indicated very clearly: Warwork has been given right-of-way at all times. Civilian work has been used simply to fill in gaps unavoidably occurring in the early stages of our war production. It has been used to provide the full workweek necessary to hold intact a group of highly skilled workers who could readily find employment elsewhere should we be forced to adopt a part-time schedule.

In order to attain our maximum effectiveness in the production of war instruments, we ask permission to continue work on the 26,000 watches which will remain on November 16, 1942, out of the quantity of 100,000 which we were

originally given permission to manufacture. By using this work to fill in, and as a basis for training new workers, we believe we can preserve our full force of skilled finishers and assemblers. If we are forced to stop all production of civilian watches on November 16, 1942, and face a sudden 100 percent conversion to warwork on that date, we estimate that approximately 60 of our skilled operators will be affected, all of the type we shall need badly when we reach our war-production peak next year.

We wish to assure you that there is no thought of business as usual in our request to continue with a small production of civilian watches. For all practical purposes we are already out of the commercial market, and the 26,000 watches remaining from our original extension represent the total which we can produce under existing circumstances. Our commercial position will in nowise be affected by the manufacture of this small quantity. If deemed advisable, we would suggest that the sale of all watches manufactured after November 16, 1942, be frozen for the duration of the war.

Please accept our appreciation of the attitude expressed in your letter dated October 23, 1942.

Very truly yours,

HAMILTON WATCH CO.,
———— ————, *President.*

WAR DEPARTMENT,
AIR CORPS, MATERIEL DIVISION,
Wright Field, Dayton, Ohio, January 22, 1942.

Subject: Limitation in instrument facilities.
To: Hamilton Watch Co., Lancaster, Pa.

1. This will acknowledge receipt of your letter of January 19, 1942, pointing out that you are unable to undertake the manufacture of additional articles of equipment such as aircraft instruments.

2. It is doubtful whether we can use your possible excess assembly capacity, as all instrument companies are now working at a maximum capacity producing parts and as far as we know manufacturing capacity, rather than assembly, is a bottleneck now throughout the industry.

3. In the future, should any manufacturing capacity become available in your company it is desired that you bring this fact to the attention of Materiel Division.

For the Assistant Chief, Materiel Division:

ALFRED H. JOHNSON,
Major, Air Corps.
K. B. WOLFE,
Lieutenant Colonel, Air Corps, Chief, Production Engineering Section.

JANUARY 19, 1942.

Maj. A. H. JOHNSON,
Production Engineering Section, Materiel Division,
Wright Field, Dayton, Ohio.

DEAR MAJOR JOHNSON: Referring to your conversation with our chief engineer, Mr. M. F. Manby, Saturday, January 17, as was stated by Mr. Manby, the Hamilton Watch Co. is not in a position to take on any work requiring either engineering or the manufacture of tools and equipment. The engineering division, the machine, gage and small tool departments of the Hamilton Watch Co. have been devoting their entire time for the past year and a half to Government work and the orders for new equipment now on hand will keep them busy during 1942.

Defense work having A–A, A–1–A and A–1–B priorities, such as 11-jewel escapements, time fuses, ship chronometers, chronometer watches, navigational stop watches and elapsed time clocks must be tooled up and placed into production as soon as possible. Since these devices have not been made in this country before, there are no available tools for their manufacture. The tools required for these mechanisms must be built to even more exact tolerances than those required for aircraft instruments and outside of watch factories, we have been unable to find any skilled tool and die makers who can handle the more exacting phases of this work. For some time we have been trying to get outside help on this problem and train new help but so far it appears almost impossible

to meet present delivery schedules on the orders we now have, and it certainly will be out of the question to take on any more manufacturing problems that would require either engineering or tooling up.

At the present time we do have assembly capacity which is not fully utilized. This assembly capacity can be used either for items which are in current production, such as standard pocket and wrist watches of the 17-jewel grade or better, or such defense items as have already passed through the engineering and tooling up stage. These items are: Comparing watches, specification 18W3(INT); navigation master watches, Army and Navy specification AN-GC-W-108; navigation watches, similar except for a 12-hour dial, being made for the British Government; timing watches for the Fairchild aerial gun camera, and map measures, Army specifications 42.1-21. Until the items now being put into production have been tooled up, we will have assembly capacity for almost any type of equipment requiring very high skills, providing we are furnished with the completed parts and any assembly jigs and test equipment that would be required.

In case we could be furnished with all of the parts necessary for the assembly of altimeters, rate-of-climb instruments, etc., we should have little trouble in assembling and adjusting them. We are not in a position to know whether your present suppliers have excess capacity for the manufacture of the parts needed for these instruments. However, in view of the present bottlenecks existing in obtaining skilled engineers, machinists, tool and die makers, and the machines necessary for the manufacture of parts, it would appear very desirable to have the companies now making these instruments operate their parts-producing equipment longer hours rather than to try to duplicate the existing facilities.

The Hamilton Watch Co. is anxious to aid the Government in every possible way. However, we would like to call your attention to the fact that the American watch industry, which normally supplies less than 50 percent of the watches consumed in this country, will without doubt be forced to supply all of the timepieces needed by all of the Allied Powers during this emergency. High-grade watches require from 6 to 9 months or longer to go through production and the help required for their manufacture and assembly must be trained from 1 to 5 years to do efficient work. Although it is relatively easy to change the productive facilities of a watch company over to other purposes, experience of the past has shown that it is extremely difficult after a lapse of even a short period of time to again resume watch production and that watch production cannot be increased at the rate of more than 10 to 20 percent a year. For this reason it will be very desirable to give extremely careful study to the military and civilian needs of timepieces during the next few years before turning the facilities of watch companies over to the manufacture of other instruments.

Sincerely yours,

L.
(G. P. LUCKEY).

NAVY DEPARTMENT,
BUREAU OF AERONAUTICS,
Washington, D. C., May 8, 1942.

Mr. M. F. MANBY,
Hamilton Watch Co., Lancaster, Pa.

DEAR MR. MANBY: The April stock report from the naval aircraft factory shows that there are obligations for 1,000 more chronographs than there are chronographs available.

Your present delivery schedule calls for 100 chronographs in September. By that time it is expected that our obligations will be increased considerably above 1,000. While it is realized that you are being asked for increased deliveries in practically everything, we ask that you investigate the possibility of excelling the contract requirements by delivering some chronographs before September and/or making a higher rate of delivery during and after September.

Please don't hesitate to overdeliver on any of our contracts as we much prefer to put up with the problem of stocking, as remote as that is for the timepieces, than to resolve a shortage.

Your cooperation in this matter will be greatly appreciated as you can well imagine the importance of the chronograph in the war effort.

Very truly yours,

CLYDE W. SMITH.

OCTOBER 21, 1943.

INSPECTOR OF NAVAL AIRCRAFT, USN,
Philadelphia, Pa.

Hamilton Watch Co., Lancaster, Pa., will have approximately 600 undelivered master navigational watches FSSC No. 88–W–510 under contract NOs–86366 and 4,500 under contract NOa(s)655 at end of October. Also will have approximately 500 navigational stopwatches FSSC No. 88–W–590 under contract NOs–88266 and 3,190 under contract NXsa–18535 at end of October. Emergency requirements necessitate delivery of 850 of the master navigational watches and 1,000 of the navigational stopwatches during November. You are requested to shorten timing specifications, wave tolerances, or take such other action as is necessary to insure that the quantities are shipped in November. December quotas will be furnished about November 4.

CLYDE W. SMITH,
Commander, United States Navy.

NAVY DEPARTMENT,
BUREAU OF AERONAUTICS,
Washington, D. C., August 17, 1942.

Mr. J. G. SHENNAN,
Elgin National Watch Co., Elgin, Ill.

Subject: Elapsed-time clock, design and tooling of.
Reference: (a) Elgin National Watch Co., letter JGS–as dated August 15, 1942.

MY DEAR MR. SHENNAN: Your letter, reference (a), confirming the agreements reached between the Elgin National and Hamilton Watch Cos. at Lancaster, Pa., on Saturday, August 8, 1942, is acknowledged with thanks.

Your understanding that Hamilton and Elgin are to arrive at a common design for the elapsed-time clock, that the tooling is to be split between the two companies, and that the clock parts made from each set of tools will be exchanged in order that both companies can assemble complete elapsed-time clocks is confirmed by the Hamilton Watch Co. It is further understood that as the tooling load eases up, both companies will complete their set of tools in order that the Navy will have two independent sources of supply for this clock.

Every effort should be made by both companies to expedite the design and production of the elapsed-time clock as the urgent need for this timepiece cannot be stressed too highly. The excellent cooperation exhibited by both companies on this project is greatly appreciated.

Very truly yours,

CLYDE W. SMITH,
Lieutenant Commander, United States Navy,
By Direction Chief of Bureau.

NAVY DEPARTMENT,
BUREAU OF SHIPS,
Washington, D. C.

Mr. C. M. KENDIG,
President, Hamilton Watch Co.,
Lancaster, Pa.

MY DEAR MR. KENDIG: A direct appeal is being made by the Navy to individual owners of chronometers to loan their instruments, for the use of the Navy for the duration of the war. It has been deemed inadvisable to make either a newspaper or radio appeal, because of the uncontrollable amount of correspondence which would result and the onslaught of undesirable instruments which would be sent to the United States Naval Observatory.

Because of the interest and cooperation demonstrated by your company, this Bureau ventures to enlist your further aid. It is requested, if possible, that you furnish the Bureau of Ships with a list of your dealers in order that they may contact them relative to chronometers that may be available, and present to them the new duration lease plan which has been recently formulated.

Respectfully yours,

C. F. SCHADT.

NAVY DEPARTMENT,
BUREAU OF SHIPS,
Washington, D. C., July 30, 1943.

HAMILTON WATCH CO.,
Mr. L. F. HALLIGAN,
Supervisor, War Contracts Division,
Lancaster, Pa.

GENTLEMEN: Under date of July 19, 1943, you furnished this Bureau with the Addressograph rolls covering 3,700 dealers on your A list to whom the Navy's appeal for ship's chronometers was forwarded. The results to date have been:

Chronometers accepted	9
Called in for inspection and appraisal	18

In addition to the above a large number of offers of chronometer watches were received but could not be accepted.

It has been decided to accept your offer and to request you to furnish the Bureau with the Addressograph rolls of your B list of 3,100 and your X list of 1,100 dealers, in order that they may be circularized with a view to rounding up a few more chronometers.

Very truly yours,

R. B. OLIVER, *By Direction.*

Senator DUFF. The first witness will be Dr. Arthur S. Flemming, Director of ODM.

I should like to submit for the record a brief biographical sketch of Dr. Flemming at this time. We shall follow this procedure throughout the hearing, and insert in the record a short biography before each witness appears.

(The document referred to follows:)

DR. ARTHUR S. FLEMMING, DIRECTOR, OFFICE OF DEFENSE MOBILIZATION

Arthur S. Flemming, born in Kingston, N. Y., June 12, 1905. Member, editorial staff, U. S. Daily (now U. S. News), 1930–34. Member, United States Civil Service Commission, July 1939 to August 1948. Chief, Labor Supply, Labor Division, Office of Price Administration, 1941–42. Assistant to Director (Manpower) and Chairman, Manpower Policy Commission, Office of Defense Mobilization, 1941. Member, War Manpower Commission, April 1942–45. Member, Manpower Survey Board, Navy Department, 1943–44. Member, Advisory Council, Retraining and Reemployment Administration, Department of Labor, 1944–47. Member, Commission of Organization, executive branch of the Government. Chairman, Advisory Committee on Personnel Management for Atomic Energy Commission, since 1948. President, Ohio Wesleyan University, since September 1948. Member International Civil Service Board, since 1950. Director, Office of Defense Mobilization, and Administrator, Economic Stabilization Agency, 1953 to date.

Senator STENNIS. Mr. Chairman, while Dr. Flemming is coming around, will the Chair state just what the issue is and just what this committee is primarily to consider. I am a new member.

Senator DUFF. The committee is to consider nothing with respect to tariff duties, but the question is as to whether or not the skills and the setup of the technical machinery and so on of the watch industry is essential to the national defense in case of emergency.

Senator STENNIS. That is our sole issue? We are to make a recommendation on that?

Senator DUFF. As to whether or not we believe it is essential in that event.

Senator STENNIS. And just for such evidentiary value as it may have? There is no bill before us?

Senator DUFF. No. There is no bill before us; but a report will be filed as to certain things that are essential. And the question is whether or not it is essential.

Senator STENNIS. You mean we will file a report?

Senator DUFF. Yes, sir. We will file a report after hearing the testimony. But we want to make clear at the outset that we are not in any degree to pass on the question of what the tariff should be. The one subject is whether or not in case of national emergency this industry is essential to the national defense.

Senator STENNIS. Thank you very much.

Senator DUFF. Dr. Flemming, if you will proceed.

TESTIMONY OF HON. ARTHUR S. FLEMMING, DIRECTOR, OFFICE OF DEFENSE MOBILIZATION, ACCOMPANIED BY JOHN F. HILLIARD, DEPUTY TO THE ASSISTANT DIRECTOR FOR MANPOWER, OFFICE OF DEFENSE MOBILIZATION

Dr. FLEMMING. Mr. Chairman, and members of the committee, as requested by the staff of this committee, I have already filed with the committee a statement.

In the interest of conserving your time, I will not read that statement at this time; but I assume that it will appear in the record.

Senator DUFF. Yes, sir, it will.

(The statement follows:)

STATEMENT OF HON. ARTHUR S. FLEMMING

I appreciate the invitation of this subcommittee to present my views on the essentiality of the American watch industry to national defense. This is a matter of great importance and one to which the Office of Defense Mobilization has been giving close attention.

It is my understanding that this subcommittee is conducting a study of the essentiality of the entire domestic watch industry. The study which is being conducted by the Office of Defense Mobilization has been limited to the jeweled watch manufacturing segment of the industry, and consequently my statement will bear principally on jeweled-watch production. The decision to focus our attention upon jeweled-watch production rather than upon the whole industry was motivated by several considerations. Perhaps the most important was that the problems affecting the jeweled-watch segment of the industry appeared most acute and most immediate. Beyond this reason, however, was the desire to limit our study to manageable proportions and attempt to develop techniques which could be applied to the evaluation of the mobilization base requirements of other industries essential to national defense.

The fact that my statement relates to the essentiality of jeweled-watch manufacturing operations should not be construed to mean that I feel other segments of the horological industry are not essential. Since we have not examined other segments of the industry in detail, I do not feel qualified at this time to express a judgment on their essentiality.

Some time ago, I was informed that declines had occurred in the levels of production and employment in the jeweled-watch industry and that these declines, if continued, might result in the loss of unique skills required in the manufacture of precision timing mechanisms essential to the national security. I immediately established an interdepartmental committee on the jeweled-watch industry, chaired by the Office of Defense Mobilization with the membership composed of representatives of the Departments of Defense, Commerce, Labor, State, and the Treasury. This committee was requested to report to me its findings and recommendations with regard to: (1) The levels of production and employment in the industry, (2) the levels of production and employment necessary to preserve the facilities and skills of the industry for national-defense purposes, and (3) in the event production and employment levels are such that wartime supply of essential mechanisms produced by this industry is imperiled, suggest means which may be used to maintain the industry at the required level.

This interdepartmental committee determined quickly that detailed knowledge of mobilization requirements for products manufactured by the jeweled-watch industry would be required as a basis for appraisal of the essentiality of the

industry to national defense. Accordingly, the Department of Defense has completed a study of military requirements during a 3-year period of mobilization and the Department of Commerce is just now completing estimates of defense supporting and essential civilian requirements for a similar period.

Since the committee will not complete its report until the end of this month, I do not at this time have the advantage of all the technical findings and conclusions of that committee. Your subcommittee chairman has, however, asked that I present my own observations and preliminary views at this time. It should therefore be clearly understood that this statement is tentative and based upon incomplete data. The full text of the committee report and a further expression of my views will be presented to this subcommittee in the near future.

Although employment in the jeweled-watch industry has remained relatively high, a progressively smaller percentage of its work force has been engaged in manufacturing jeweled-watch movements. These movements are produced only by the jeweled-watch industry and their manufacture requires the highest degree of skill and tooling of any product manufactured in quantity by the industry. Consequently, even though overall employment in the industry may be sustained by the production of such military items as fuzes and rear-fitting devices, the most critical and highly developed skills are maintained only through the continuing manufacture of jeweled-watch movements. Prolonged disuse of these skills not only results in the dispersion of the skilled labor force but in the partial or complete loss of the skills themselves. The issue which therefore involves the national security is whether production and employment levels in the jeweled-watch industry have declined or threaten to decline to a point where the highly skilled manpower in the industry would be inadequate for the rapid expansion of production required in the event of full mobilization.

In deciding this issue the magnitude of the requirements which would be placed on the industry is of the first order of importance.

The Department of Defense has reported that certain technological developments in the pin-lever watch field have substantially reduced the requirements of the Armed Services for jeweled-watch movements. These requirements have been further reduced by changed distribution and management of jeweled watches in the services. Although the remaining requirements of the services for jeweled-watch movements in full mobilization are considerable, they are far below earlier estimates.

The Department of Defense regards the facilities of the industry as highly desirable capacity for the manufacture of other military items but believes that all items other than jeweled movements would be procurable from suppliers outside the jeweled-watch industry.

On the other hand, the Department of Commerce estimates that essential civilian requirements for products uniquely supplied by the jeweled-watch industry would be far larger than in World War II. Moreover, it appears unwise to count on the large imports of jeweled movements which were available in World War II.

The Department of Commerce in its preliminary estimates of defense-supporting and essential civilian requirements calls attention to the difficulty of predicting military or civilian requirements for precision jeweled-timing mechanisms in a period of rapidly changing technology. It is a well-known fact that both industry and military units require more and more dependence upon precise and dependable measurement of time with the increase of speed, automation, and complexity of operations. As is usually the case in technological development, the changes taking place in the manufacture and use of timing mechanisms have eased certain problems but have created new ones. It seems likely that in the event of war the requirements placed on the jeweled-watch industry would not be for the same number or kinds of products required in the last war. Nevertheless, it is my judgment that the new requirements which would be placed upon the industry would be as great as those of World War II, and that the unique skills of jeweled-watch makers would be of prime importance to the national security.

There are certain additional factors which may generate important requirements for jeweled watch movements or seriously reduce our capacity to produce such movements. For example, at least one company in the jeweled watch industry has made a significant start in research and development involving extreme precision, miniaturization, and instrument sensitivity. The direction and rate of growth of such research and development could have an important bearing on mobilization requirements placed on the industry.

A factor of even greater importance and more difficult to evaluate is the potential impact of enemy attack. Such an attack might both substantially reduce the

capacity to produce jeweled movements and other precise mechanisms and at the same time greatly expand requirements for such products.

The experience of World War II clearly demonstrated that there are many and varied military and essential civilian products for which the jeweled watch industry is either the sole supplier or a highly qualified segment of the supply base.

The statistical estimates of end item requirements from the industry indicate that very substantial demands would be made on the industry in the event of full mobilization. Even so, these estimates must be augmented by intelligent appraisal of the variable factors which may emerge as highly important and by our experience in the last war. These and a prudent concern for maintaining a reasonable safety factor in matters of national security suggest that the facilities and skills of the jeweled watch industry constitute an essential part of our defense mobilization base. These facilities and skills should be maintained at a level from which a quick and effective expansion of production can be made in the event of national emergency.

Dr. FLEMMING. I will simply address myself to the questions that are of primary concern to this committee as indicated by the chairman just a few minutes ago. First of all, I might say that there has been an interagency committee studying the jeweled-watch industry over a period of months, which has been chaired by the Office of Defense Mobilization and which has just filed with me a report. I have not had the opportunity of analyzing the report in terms of arriving at a decision as to whether or not I am willing to accept all of their recommendations.

I also will want to have the opportunity of consulting with the Defense Mobilization Board which is an advisory board to me before making any final recommendation.

But staying first of all with the jeweled-watch industry, I would like to address myself first of all to the question: Is the preservation of the skills of the American jeweled-watch industry essential to the national security?

My answer to that question is unqualifiedly "Yes." There is no doubt in my mind on the basis of the evidence that I have had the opportunity of considering and on the basis of my own experience that that question should and must be answered in the affirmative.

The second question is this: Is production and employment in the industry at such levels as seriously to threaten preservation of those skills? And on the basis of the evidence that has been presented to me, there is no question in my mind at all but that that question must also be answered in the affirmative.

In other words, production and employment is below a level which will insure the preservation of that part of our mobilization base. I might say, Mr. Chairman, and members of the committee, that as we approach this whole defense mobilization problem, one of our chief concerns is this problem of preserving our mobilization base, and developing and maintaining that base.

And, as we approach it in this area or in any other area, we of course, first of all, try to determine what would constitute an adequate mobilization base, and we try to determine whether or not we have that base at the present time. And if we decide that we do not have it at the present time, then we try to develop the kind of program that will help insure the bringing into existence of such a base.

And as far as the jeweled-watch industry is concerned, it is an integral part of our defense mobilization base. At the present time, production and employment is below the level that it should be at in order to maintain that base in a sound manner.

Now, just what that level should be is something that the members of this committee will appreciate is always difficult to determine. And it is the kind of thing that reasonable people can differ on very easily. We have done some work along the line of determining what that level should be in the jeweled-watch industry, but it is not complete. For example, personally I intend to ask the industry itself for its best judgment as to what that level should be and ask them to give us justification for any conclusion that they may state along that particular line, recognizing, however, that the level is not what it should be at the present time—that is, the production and employment level.

And then the question arises as to what does the Government do in order to bring it up to that level? And we are addressing ourselves to that question. We will recommend to the President a positive program designed to bring it up to a particular level.

Of course, one obvious matter that is bound to be considered in connection with that is the tariff. I know this commitee is not going into that. And also, as you appreciate, that is a matter pending before the President at the present time. Consequently, it would not be appropriate for me to go into it at this particular time.

Now, addressing myself briefly to the watch industry as a whole, there is no question in my mind at all but that the watch industry as a whole is essential to the national security. I do not have the benefit of the same kind of a study that we have in the jeweled watch industry; so I am not in a position to comment on the present levels of production and employment.

But certainly the same principles and the same tests that I have just outlined as far as the jeweled watch industry is concerned should be employed to the watch industry as a whole. That, Mr. Chairman, is my position as Director of the Office of Defense Mobilization on this matter.

Senator DUFF. Are there any questions?

Senator COOPER. I have some questions. Dr. Flemming, did I understand you to say that you have had a committee which has been making a study of the watch industry to determine whether or not it is essential?

Dr. FLEMMING. It is an interdepartmental committee; and it was studying the jeweled watch industry.

Senator COOPER. What departments were represented on the committee?

Dr. FLEMMING. Mr. Hilliard can check me on this. But it is: Defense, Commerce, Labor, Treasury, and State.

Senator COOPER. Did that investigation or study have anything at all to do with the application before the Tariff Commission?

Dr. FLEMMING. No.

Senator COOPER. It is directed solely toward essentiality of the industry for defense?

Dr. FLEMMING. That is right. Looking at it particularly from the standpoint, Senator, of the skills that are present in that industry.

Senator COOPER. Now, I assume that—or you say that—the industry is essential. Do you mean that in case of war or mobilization, those who work in that industry would be needed for particular defense tasks?

Dr. FLEMMING. That is right. I mean needed not only for the purpose of producing the watches and so on—and, of course, there would be a requirement for that—but past experience has indicated that the

skills that are present in this particular industry are skills that we can use very effectively in connection with the production of other items. So that there is not any doubt in my mind but that those skills are essential.

It is very difficult to train people to the place where they have those particular skills. And I think it is important not only to keep intact, as far as we can, those who now have those skills, but it is also very important for us to have the kind of industry that will attract younger people into it so that they, in turn, will develop those skills.

Senator COOPER. Can you name some of the operations or tasks to which these workers' skills would be directed in case of war or mobilization?

Dr. FLEMMING. You mean in addition to the——

Senator COOPER. In addition to the making of watches.

Dr. FLEMMING. Of course, the Defense Department, whose testimony you will hear later, can be very specific on that point. We do have a report here which identified some of them. And I would be very glad to list some of them in the record.

Senator COOPER. Can you name offhand just a few of them?

Mr. HILLIARD. Principally fuses, safety and arming mechanisms, and timing devices.

Senator COOPER. Now, is there any other source from which these skills can be drawn—any other industry? That is, is there any place that you could find comparable skills?

Dr. FLEMMING. You can get a debate on that, of course; but our own judgment is that it would be very, very difficult to find those skills any place else. It is conceivable that you could break down some of the operations and use other people. But we would be unnecessarily, it seems to me, penalizing ourselves as far as our war production effort is concerned.

Senator COOPER. To get down more specifically: Do you now know of any other industry where these skills are available, or at least where there is a labor force with these skills which could be used?

Dr. FLEMMING. No.

Senator COOPER. Is there any?

Dr. FLEMMING. No, not in my judgment. Mr. Hilliard might like to comment on that.

Mr. HILLIARD. Insofar as the manufacture of jeweled watch movements are concerned, there are no alternative facilities or skills available. The only skills available are in this segment of the industry. Insofar as the manufacture of fuses and safety and arming mechanisms are concerned, that is an important facility. But there are other facilities that can manufacture those items. But insofar as the jeweled watch movements segment is concerned, the skills in this industry are unique in the sense that no other industry produces those with those movements.

Senator COOPER. Now, with respect to the manufacture of fuses, is this industry indispensable for the manufacture of fuses? Suppose you did not have any watch industry; are other people available who could manufacture fuses?

Dr. FLEMMING. I think it is always difficult to say that an individual or a group of individuals are indispensable. But my approach to that would be that if we did not have this industry and did not have this industry in a healthy condition, we would be deliberately penalizing

ourselves as a nation as far as the production of fuses and other timing devices are concerned.

So my feeling is that these people are an integral and essential part of our mobilization base and that the government should recognize that and do everything it can do to maintain that portion of our base.

Senator COOPER. Did your committee make a recommendation to anyone, to the President, or anyone?

Dr. FLEMMING. What will happen, Senator Cooper, is, after I have had the opportunity of analyzing the results of this interdepartmental study, and after I have had the opportunity of getting the advice of the Defense Mobilization Board, which is made up of seven Cabinet officers and the Chairman of the Federal Reserve, I will personally make a report to the President outlining the kind of a program that in my judgment, if followed, would make it possible for us to keep this part of our mobilization base intact.

Senator COOPER. I think that is all for the present, Mr. Chairman.

Senator DUFF. Senator Stennis.

Senator STENNIS. Dr. Flemming, I am a newcomer to this subcommittee and a newcomer to this subject. And you know far more about this than I do. But, in answer to Senator Cooper's questions, he asked you if there were other manufacturers that could make these strategic items other than watches. And you said, if I understood you correctly, that it would be very difficult to find other manufacturers, but your assistant said that there were others. But he did not name the others.

Now, who are the others, if any, who make these other strategic materials? I mean other than watches.

I have no idea who they are. You say there are some others. But who are they, in general? Is it General Electric, or who is it?

Mr. HILLIARD. Well, the other people principally who make them are other members of the horological industry; manufacturers of clocks and watches and the nonjeweled segment of the watch and clock industry is a very large supplier. In addition to that, there are certain companies outside the horological industry entirely such as Eastman Kodak; it has a division that manufactures them. There are a variety of companies, both inside the industry, but other than the jeweled watch companies that are entirely outside the industry that have developed specific facilities and skills for the manufacture of these things.

Now, a little later, as Dr. Flemming has said, the Department of Defense will speak in detail on these, because they have the contractual relationships with the companies, and they know in precise detail what they have and how the allocation is distributed among them. But, generally speaking, the break is that the unique manufacturing is on jeweled watch movements. They are important producers of other items but only along with other members of the industry and a few companies outside the industry.

Dr. FLEMMING. That is why, Senator, in my direct testimony I indicated that in my judgment the preservation of the skills of the entire industry, not just restricting myself to the jeweled watch industry, but the entire industry, is essential to the national security.

Senator STENNIS. Yes. Well, this might have been covered already in previous hearings; but I just do not——

Senator DUFF. This is the first hearing.

Senator STENNIS. But I was just trying to get the panoramic picture of all of these industries that are involved; for instance, the industries that make fuses. And you say that will come in from the Department of Defense?

Dr. FLEMMING. Yes. But as Mr. Hilliard indicates, he went beyond the jeweled watch industry then. He was thinking primarily in terms of the total watch industry, the total horological industry, and not just restricting ourselves to the jeweled watch aspect of it.

Senator STENNIS. What is the distinction there? You say jeweled watch industry.

Is there more precision involved there? I suppose that is the higher grade watches; is that right?

Mr. HILLIARD. Yes. And with the very expert testimony that you will receive from the industry—and they are in this room—I am a little loath to be an expert at this time before the committee. But essentially the difference is that the jeweled watch manufacturing segment employs great precision and jewels, the type of thing that you have in fine watches.

Senator STENNIS. That is all I have, Mr. Chairman. Thank you very much, sir.

Senator DUFF. Thank you, Dr. Flemming.

The next witness is Mr. Thomas P. Pike, Assistant Secretary of Defense.

(Biography of Mr. Pike:)

THOMAS P. PIKE, ASSISTANT SECRETARY OF DEFENSE (SUPPLY AND LOGISTICS)

Thomas P. Pike, born in Los Angeles, Calif., 1909. Attended Harvard School in Los Angeles; graduate of Stanford University, 1931, A. B. in economics. After association with Republic Supply Co. of California, in 1938, Mr. Pike formed the T. P. Pike Drill Co., which he has headed since that time. He is also western trustee of the Council of Profit Sharing Industries; vice president of the Casualty Insurance Co. of California and a former director of the Los Angeles Chamber of Commerce and Merchants and Manufacturers Association. Deputy Assistant Secretary of Defense for Supply and Logistics from September 1953 to April 1954; Assistant Secretary of Defense for Supply and Logistics from April 1954 to date.

Senator DUFF. Proceed, sir.

TESTIMONY OF HON. THOMAS P. PIKE, ASSISTANT SECRETARY OF DEFENSE (SUPPLY AND LOGISTICS), DEPARTMENT OF DEFENSE, ACCOMPANIED BY A. WILLIAM BUSCHMAN, CHIEF, COMPONENTS BRANCH, OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE (SUPPLY AND LOGISTICS)

Mr. PIKE. Mr. Chairman, and members of the committee, I am representing the Department of Defense here today. In the interest of brevity, I will not read the statement we have filed with your committe, but rather I will confine myself to a very brief statement. And then I would be very happy to attempt to answer any questions the committee may have for me.

(The statement follows:)

STATEMENT OF HON. THOMAS P. PIKE

I am appearing before you today in response to your invitation to present the Department of Defense position regarding the American watch industry.

Your notice for this hearing indicates that it is to cover the entire American watch industry, that is, the manufacturers of jeweled watches, nonjeweled watches, and I assume the entire horological industry. All of these manufacturers are valuable and essential to the Department of Defense. They produce such products as jeweled watches and movements, mechanical time fuses and other special timing and precision devices requiring specialized engineering, small-parts production and manual skills so traditionally identified with the horological industry throughout the world. These products represent the split-second timing required for the movement of troops, air groups, ships, and all forms of military equipment plus the highly essential mechanical time fuses and rear-fitting devices which determine the arming and exploding of shells and rockets. The Armed Forces would be vitally handicapped without this equipment.

By the general nature of their products the different segments of the horological industry overlap in many of their techniques and crafts and yet specialize in certain details. It is, therefore, from a Defense Department standpoint nearly impossible to arrive at a determination that any one part of the horological industry is more essential for defense than any other part.

At the request of the Office of Defense Mobilization, my office conducted a study on the essentiality of the jeweled watch industry. The conclusion of this study indicated that the jeweled watch industry was uniquely qualified to produce jeweled watches and movements to an extent that could not be demonstrated by any other segment of either the horological industry or any other industry in the country. On the other hand the mobilization requirements for jeweled movements for a 3-year mobilization period was found to be well within the capacity of the four companies to produce well within a year's time. It was recognized that in addition to jeweled movements these same companies had been allocated the production of approximately 12 percent of the mechanical time fuses and similar arming devices planned for mobilization requirements. In addition it was recognized that they manufacture other items of significance to the Defense Department. Nevertheless we did not feel that special treatment should be extended the jeweled watch industry in preference to the rest of the horological industry.

The conditions causing the horological industry to gradually discontinue manufacturing are common to all segments of the industry. It is simply that first in the case of jeweled watches and more recently in the case of nonjeweled watches and clocks it is possible to import the equivalent product, duty paid, for less than it can be manufactured in the United States. This is despite the past high volume of production and modern manufacturing equipment and technique which is equal to or better than the foreign producers. The difference lies entirely in the lower dollar cost of labor in imported products, labor being the most predominant factor in the cost of horological products. In view of this situation, the importers found themselves in a favorable competitive position with the domestic manufacturers which led to domestic manufacturers also importing foreign products and decreasing their domestic production despite an increasing market. This trend may continue until the volume of production in the United States becomes so low that it will not be sufficient to meet full mobilization requirements. Obviously this situation would be extremely serious to our military effort.

The committee, appointed by the President, investigating the jeweled watch industry in late 1952, reported in January 1953 to the effect that no action was immediately necessary but suggested that if production declined to the peril-point consideration should be given to the following measures:

1. Advanced procurement of watches by the Department of Defense

Comment: This would not insure sustaining either the jeweled watch or the nonjeweled watch industry for an indefinite period as the recently established requirements are so small that they could be produced within approximately a year's time. It would also not permit the production of changing types to meet the requirements of military developments.

2. Preferential procurement from domestic jewel watch manufacturers

Comment: All watches and most similar timing mechanisms are currently procured from the horological industry. Mechanical time fuses and arming devices are also currently procured from the horological industry, plus some industries not identified with the horological field. As these other industries have long been suppliers of these products it would be discriminatory not to continue purchasing from them as they are also essential to complete the full mobilization planned production capacity. The production of mechanical time fuses does not in all cases involve the same skills as required for watches and timing devices, and therefore, does not necessarily maintain the basic skills of the industry.

3. For direct subsidy

Comment: Direct subsidy also has a tendency to be discriminating both within the horological industry and in comparison to other essential defense industries to the point that it should not be considered except as a very last resort. Direct subsidy for civilian products is not within the province of the Department of Defense.

4. Accelerated amortization of capital equipment

Comment: This would not be helpful, as the facilities already exist and can be maintained providing the horological industry has a normal civilian competitive market.

5. Removal of the excise tax

Comment: This would only be of assistance in the event it applied to the domestic manufacturer of horological products but was retained on imported products. This, in effect, would be similar to increasing tariffs.

6. Tariff increase and import quota

Comment: These measures are not within the province of the Department of Defense, but if either the tariff on imports was increased or import quotas provided and applied equitably to all horological products the domestic production might be improved or the trend to further decrease arrested. If the 1953 level of domestic production could be maintained as a minimum it should be sufficient to meet mobilization requirements.

In conclusion I wish to reaffirm the vital essentiality of the horological industry for defense. If any measures to sustain domestic production can be devised that will apply equitably to the entire horological industry the Defense Department would endorse them as assisting to maintain an important part of the mobilization base.

Mr. Pike. In general from the standpoint of the Department of Defense, and speaking strictly to the national security, the national defense angle of this problem, I can wholeheartedly concur in the general conclusion reached by Dr. Flemming in regard to the entire horological industry. And by that I mean not only the jeweled watch industry but, in addition thereto, the nonjeweled watch industry and the clockmaking industry.

There is no question but that the skills involved in these several industries, constituting in its entirety what we call the horological industry, are vitally essential to our national defense in the event of mobilization. As your committee knows, the Department of Defense has submitted a report to Dr. Flemming as one member of his interdepartmental committee, in which we addressed ourselves only to the jeweled watch segment of this total horological industry.

However, the total job done in our report constituted a very searching and careful inquiry into our 3-year mobilization requirements for watches, clocks, timepieces of various descriptions, in addition to the fuses, timing devices, et cetera, that are made by the companies engaged in the manufacture of jeweled watches and the other members of the horological industry.

And, so, generally, as I say, our conclusion is that this entire industry is extremely important—is vital, I would say—to the national

defense of this country. We do not feel that it is the province of the Department of Defense to make recommendations as to ways and means which might be properly used to see to it that a good healthy basic group of skills and production is maintained by the domestic horological industry.

We, of course, have a vital interest in it. I think that very briefly, Mr. Chairman, summarizes the Department of Defense's position. I am delighted that your committee is, today, addressing itself to the entire horological industry.

Senator DUFF. You were here, Mr. Secretary, during the testimony of Dr. Flemming?

Mr. PIKE. Yes.

Senator DUFF. You heard his testimony?

Mr. PIKE. Yes, I did.

Senator DUFF. Do you concur completely with what he had to say?

Mr. PIKE. Yes, sir.

Senator DUFF. Does the last sentence in your prepared statement mean that the Defense Department will not support measures to sustain a segment of the watch and clock industry if it is shown this segment presently needs support to survive beyond other segments of the industry?

Mr. PIKE. Mr. Chairman, I do not think that I am in a position today to give a full and conclusive answer to that question.

As I indicated in my statement, the Department of Defense deems the entire horological industry to be vital to the defense of the country in the event of mobilization. As I have also indicated, there are several segments of this industry under peacetime conditions which compete with each other to an extent. And just generally I would say that in the interest of fairness and equity that I personally would not favor some preferential treatment for one segment of a competitive industry that might work out to the detriment of another segment that would be equally important to the mobilization base.

Senator DUFF. In other words, you believe that all the segments are essential to the mobilization base?

Mr. PIKE. That is correct, sir.

Senator DUFF. Senator Cooper.

Senator COOPER. Are you a member of the committee to which Mr. Flemming referred?

Mr. PIKE. The Department of Defense is a member of that committee. The representatives on that committee are individuals from our office, the Office of the Assistant Secretary of Defense for Supply and Logistics.

Senator COOPER. I have read your statement. I note that you say in the event of mobilization that watches and jeweled movements would be needed, but that they could be supplied within a year.

Mr. PIKE. Yes. I do not believe that it is perhaps proper for me to go into the necessary details to give you a very responsive answer to the question; because it has to do with mobilization requirements. But suffice it to say that our inquiry on that score did indicate that as one possible means of support or assisting the industry that the Department of Defense might go into a procurement for part of the mobilization requirements.

Senator COOPER. That would not meet the problem of the continued manufacture of fuses and other timing devices?

Mr. PIKE. That would be a shot in the arm and it would be over almost before it started. It would have no permanent effect.

Senator COOPER. Is there any other industry, in your study, which would manufacture these mechanical fuses, mechanical devices?

Mr. PIKE. Yes, there are other segments of the industry that are apparently manufacturing and providing part of the Department of Defense requirements on fuses and timing mechanisms. A couple of them have been mentioned. Eastman Kodak Co. is one, Merkel Metals Products, Lux Clock Manufacturing Co. I mention Lux Clock to indicate that here again is a clock-manufacturing industry that is not included under the jeweled watch industry segment or the nonjeweled watch industry segment. But they are participating in the fuse program. Also there is Supreme Products. And I believe there are other companies that might be mentioned in such a list.

Senator COOPER. Can you answer this question:

Suppose you did not have this reservoir of skill in the watch industry; are there enough people outside the industry who could manufacture and take care of just these mechanical fuse devices? Do you know whether or not that is possible?

Mr. PIKE. In my opinion, I do not think there are. We have been rather amazed at some of the skills that have been developed in comparatively recent years. However, even these other concerns, these other industries of which I have named but a few as examples, still rely for some of their finest, most precise parts, on various segments of the horological industry. And, although, as I say, this progress in skill and this miniature type of work and proficiency has been quite surprising, I would still be inclined to think that it would be a dangerous thing again from the point of view of national security and defense if any sizable segment of the watch industry or horological industry were to disappear from this country.

Senator COOPER. Can you state from your studies as a member of that committee whether or not there are certain devices, timing devices—I do not know how to describe all of these—but I understand generally what you mean—mechanisms or devices which are required now for special weapons which cannot be supplied outside the watch industry?

Mr. PIKE. Cannot be supplied?

Senator COOPER. Yes. The work could not be done except by workers trained in the watch industry. That really is the thing we are trying to find out; is it not?

Mr. PIKE. Yes. If I may address that question to a member of my staff who is perhaps a little more intimately acquainted with the details of this program. Mr. Buschman, did you hear that question?

Mr. BUSCHMAN. Yes, I did. I would say that the answer to that is "No"; but, it may be qualified to the extent that there are some developments at the present time which are being engineered by some of the watch companies. Consequently, the other firms would not have any opportunity at this point to produce such items. I would say generally the answer to the question is the work could be done by workers in other industries.

Senator COOPER. We have just been in a war, the Korean war; and shortly before that, we were in World War II. Is there any information available to show what use was made of the skilled workers in the watch industry? And is there any information to show what use is

being made of them now in very intricate types of weapons? And are there any comparative figures as to the number of people from the watch industry that have been engaged in these special devices as against other people who have been brought in?

Mr. PIKE. Senator, I do not have those details or figures at my fingertips. The answer to your question, I am certain, is available here from members of the industry and certainly will be available when Dr. Flemming's study is finished.

In the Department of Defense we have not addressed ourselves down to the question of the number of skilled watchmakers involved in each segment of this industry.

Senator COOPER. Can you say categorically then that there are certain types of work that must be done in the manufacture of weapons which cannot be done by any group other than those skilled workmen in the watch industry.

Mr. PIKE. Isn't that pretty much the same question that we put to Mr. Buschman here?

Senator COOPER. I mean can you say, or do you know from your own studies, or from the advice you have had from your committee?

Mr. PIKE. The question is: Do I know——

Senator COOPER. My point is this: it seems that what we are trying to determine is if this body of workers—if their skills are unique and essential in the manufacture of very intricate devices connected with our defense.

Now, is this the only body of workers which can be used in making very intricate and necessary devices? Are they absolutely essential to the manufacture of those weapons, those devices?

Mr. PIKE. I think I can answer your question in two parts there. I think it is phrased in two parts.

No. 1: No, the watch industry, jeweled and nonjeweled, and the clock industry, the whole horological industry does not have exclusively these kinds of skills. As we have indicated, other companies have gone into the manufacture of these timing devices which are quite intricate and involve very comparable types of work and skills. But, at the same time, I would not say that it would be a safe, prudent thing for this country to attempt to rely upon these other industries that have been building up these skills and have become quite expert.

In answer to that question, I think prudence would dictate that we should do, or that the Government should do what it can do to preserve a certain minimum base in skills and with the special equipment, tools, machinery and so forth, which the horological industry in this country possesses today.

Senator COOPER. That is all I have, Mr. Chairman.

Senator DUFF. Senator Stennis.

Senator STENNIS. Mr. Chairman, I understood from Mr. Flemming that the Department of Defense is going to give us a breakdown on these companies.

Mr. PIKE. Yes. I have indicated several of them here.

Senator STENNIS. Would you mind repeating those just very briefly? I have no idea of who they are.

Mr. PIKE. Just to name a couple here: Eastman Kodak Co., Merkel Metals Products, the Lux Clock Manufacturing Products, King-Seeley Corp. And then in the list, of course, are the nonjeweled watch people as well as the jeweled watch people.

Senator STENNIS. I want to join Senator Cooper in his question there about the number of men that actually are employed in these essential endeavors here—or at least a fair estimation of it. How many are engaged now? And how many were during the Korean war?

Mr. PIKE. I am not competent to answer that question, Senator. I am sorry.

Senator STENNIS. I know you could not have that on your cuff; but it seems to me that we ought to have something like that for the record. And it will have to come from the Department of Defense, I suppose.

Mr. PIKE. Well, I am certain that there are probably people here, both from the industry and from the Department of Labor and Commerce, who are represented here, who could furnish that.

Senator DUFF. I understand that they will give testimony to that effect.

Senator STENNIS. All right. Thank you. That is fine then. That is all I have, Mr. Chairman.

Senator DUFF. Thank you, Mr. Pike.

The next witness is Assistant Secretary of Commerce, Mr. Lothair Teetor.

(Biography of Mr. Teetor:)

LOTHAIR TEETOR, ASSISTANT SECRETARY OF COMMERCE

Lothair Teetor, Assistant Secretary of Commerce, born Hagerstown, Ind., 1897; University of Wisconsin 1917–18. Began as clerk in the Perfect Circle Co., piston ring manufacturers, Hagerstown, 1920–21; sales manager 1921–38; vice president 1926–38; president 1938–46; chairman of the board 1946. Served in United States Navy 1918–19. Representative in General Assembly in Indiana 1945–47, 1949–51. Assistant Secretary of Commerce October 1953 to date.

TESTIMONY OF HON. LOTHAIR TEETOR, ASSISTANT SECRETARY FOR DOMESTIC AFFAIRS, DEPARTMENT OF COMMERCE, ACCOMPANIED BY ARTHUR H. STUART, INDUSTRIAL ANALYST, SCIENTIFIC, MOTION PICTURE, AND PHOTOGRAPHIC PRODUCTS BRANCH, BUSINESS AND DEFENSE SERVICES ADMINISTRATION, DEPARTMENT OF COMMERCE

Mr. TEETOR. Mr. Chairman, and members of the committee, the Department of Commerce has submitted a statement.

Senator DUFF. We would prefer, unless you have some other idea about it, to have you file this statement as the others have done, and then make a verbal statement as to what you want to emphasize particularly and subject yourself to questions by the committee.

Mr. TEETOR. Yes, sir.

These are the comments that I would like to make about the statement.

Senator DUFF. The statement at this point will be made a part of the record.

(The statement follows:)

STATEMENT OF HON. LOTHAIR TEETOR

Consideration of the essential nature of the domestic horological industry must embrace all segments of that industry, namely: (1) Jeweled-watch manufacturers; (2) pin-lever watch manufacturers; (3) clock manufacturers; and (4) manufacturers of component timers. This industry applies and develops the unique sciences of horology. It manufactures timepieces of all kinds—clocks, watches, industrial and scientific timing devices, and controls, and a great number

of highly critical military devices. The dependence on clockwork and timing mechanisms is universal. Essentiality of the facilities to produce them is manifest.

This statement is directed toward a more detailed insight and analysis of the importance to the national security of only one segment of the total horological industry, namely the domestic jeweled-watch industry. It is perhaps one of the more sensitive and unique segments of the total industry and is currently under detailed study because of the extensive deterioration of its manufacturing facilities being caused by imports. These considerations applied to the jeweled-watch problem are significant to the study of the total watch industry.

THE JEWELED WATCH INDUSTRY

The domestic jeweled-watch manufacturing facilities constitute a small and highly specialized industry composed of four companies: The Bulova Watch Co., the Elgin National Watch Co., the Hamilton Watch Co., and the Waltham Watch Co. The prewar employment level of this industry averaged about 8,000 workers, reaching a World War II peak of 12,000. Current employment levels are about 9,500 workers, less than half of which are engaged in the manufacture of jeweled watches.

These companies have no counterpart in American industry. Other manufacturing plants occasionally work to tolerances as close as the jeweled watch manufacturers but do not apply these tolerances to such minute parts on a continual mass production basis. The highly specialized skills of this industry are the product of generations of research and development and cannot be considered as interchangeable with any other industry.

The unique nature of this industry can perhaps best be described by a quotation given by an industry spokesman, as follows, "Nowhere else is concentrated such a large group of skilled employees in precise machinery of a peculiar character as is concentrated in each jeweled-watch company. Watch manufacturing machinery itself is uniquely specialized. In some cases it can be imported from Switzerland. In other cases it must be manufactured here. This involves, of course, complete design and manufacture within the industry. Such equipment as is purchased outside must frequently be torn down and rebuilt to more exacting specifications. This, of course, involves the maintenance by the industry of a sizable engineering and tooling department.

"The consolidation of production personnel trained to work to extremely fine tolerances with minute parts, together with the engineering know-how and ability required to support and supplement such a precise manufacturing group without benefit of outside consultation or assistance, constitutes an unusual facility whose integrated skills have been, and will continue to be indispensable."

The domestic jeweled-watch industry represents the only significant manufacturing facility for production of jeweled watches outside of Switzerland. It is, therefore, the only competitive force remaining to insure that the American consumer receives a quality product for a reasonable price. The Swiss industry controls over 90 percent of the world market and about 85 percent of the United States market for jeweled watches. Although France, Germany, and Italy have small jeweled-watch industries, they operate largely with Swiss-made components. Great Britain is currently attempting to rebuild her jeweled-watch industry which was allowed to deteriorate prior to World War II.

RELATIONSHIP TO NATIONAL SECURITY

The relationship of this industry to national security was the subject of an interdepartmental committee report submitted to the President on January 8, 1953. This committee found that the production facilities of the jeweled-watch industry were both unique and highly essential. According to an unclassified press release from this report the principal problems of maintaining an adequate mobilization base with respect to the jeweled-watch industry are: (1) The industry is dependent upon a very highly skilled group of designing, engineering, tooling, and supervisory workers and some highly skilled production workers. (2) These skills can be acquired only after long training periods. (3) The number of workers in these categories cannot be rapidly expanded in an emergency. (4) The skilled personnel can be retained during peacetime only to the extent that their skills can be profitably used in commercial production. (5) Their skills can be maintained only by use in production of jeweled watches.

During World War II this industry was completely converted to military production with the exception of a few instances where small amounts of capacity had to be diverted to meet critical needs for essential civilian timepieces. During the wartime period the industry delivered to the Armed Forces 3.5 million timepieces, 4.2 million instruments other than timepieces, 22 million fuses, and 7 million fuse components. It also produced more than 350 million precision parts for other prime contractors of critical military equipment. Although the industry was expanded as rapidly as possible it was sorely pressed to meet the demands which were placed upon it.

Evidence of the domestic industry's lack of capacity to fully satisfy military requirements during World War II is contained in a War Production Board memorandum, dated September 4, 1943, describing the Armed Forces' need for 850,000 watches annually in excess of the number that could be produced in the United States. In order to meet this additional requirement it was necessary for the War Production Board to place certain types of imported watches under allocation. Further evidence of the extreme pressures on the domestic jeweled-watch industry during World War II can be obtained from a War Production Board report, dated May 17, 1945, which requested the State Department to make special arrangements with Switzerland to acquire critically needed tools and equipment. This report states: "Owing to the extreme urgency of the situation, the watch industry converted its normal facilities to the tremendous requirements of the military. During the war period the skill and equipment of this industry has been pressed to capacity and operations have been maintained in many cases on a 24-hour basis with no letup to permit the proper preservation and maintenance of tools and equipment which normal conditions would permit."

The jeweled watch industry's contribution to the war effort during World War II was not confined to timepiece production. Early in the war it was discovered that the original Junghans fuze would not function properly when fired from a worn gun. A jeweled-watch manufacturer solved this problem by redesigning and strengthening the fuze. Another member of the industry designed and developed the first combination point detonating and mechanical time fuze. When the Navy reported serious rusting of fuzes aboard ship, it was the jeweled-watch industry that quickly developed a method for waterproofing these fuzes.

According to an Army report published in 1951, the Allied campaign in North Africa was seriously hampered because of the German advantage in armor-piercing tank shells. "It was not until well into the Italian campaign that armor-piercing shells equipped with fuzes and high explosive fillers became available to the Allied Forces." The fuze contract which resulted in this achievement of parity in United States antitank weapons was awarded to a jeweled-watch manufacturer in August 1942. The first pilot lot was completed in November 1942, and full production began in December 1942. This company was the first contractor out of 40 to produce this fuze.

The domestic jeweled-watch industry also was responsible for satisfying critical needs for jewel bearing during World War II. An indication of the importance of jewel bearings to the Air Force is given by the War Production Board's letter of April 27, 1943, to one of the companies: "The production of instrument jewel bearings is a vital factor in our program for increasing aircraft production. As a result, jewel bearings have been designated one of the 35 most critical components of military production for which orders must be placed and scheduled through the entire year." Imported jewel bearings proved to be a most uncertain source of supply, and from November 1942 to March 1943 no bearings were received from Switzerland. "To meet the military requirements for jewel ring bearings during this critical period the jeweled-watch companies concentrated on converting their own large size jewels to sizes suitable for instruments. Breakage was high and the converted jewels were expensive but they saved the day." (War Production Board Report On Jewel Bearings In World War II.)

Although the pressures during the Korean war were not as great, the contributions of the jeweled-watch industry were highly significant. The facilities of this industry were repeatedly called upon to solve critical problems and break bottlenecks which occurred. When increased firing velocities of aircraft rockets caused premature explosion, a company from the industry was called to provide an answer. Tests were conducted, the safety device redesigned, new tools built, and delivery of satisfactory safety devices was accomplished in 28 days. Another company from the industry successfully broke a production bottleneck on piezoelectric crystals for communication equipment and established satisfactory production methods after several other companies had failed. During the Korean

war, this industry produced over 19 million artillery and rocket fuzes on direct military contract, over 160 million fuze and instrument parts on subcontract to other producers, as well as many other small, precision mechanisms.

CIVILIAN TIMEPIECES

In addition to the important role the jeweled-watch industry fulfills in the supply of military-end items, studied attention must be paid to the dependence on the skills and facilities of this industry for the precision timepieces so critically needed for war-supporting and essential civilian uses. During past wars the availability of imported watches and jeweled movements permitted the previously described absorption of domestic manufacturing facilities with military items, while imports were relied upon to meet other needs for precision timepieces. Present planning for future emergencies cannot be based on this risky premise, and the domestic facilities must be looked to as a source for filling critical nonmilitary needs as well as for meeting military requirements.

At no time during past wars has sufficient manufacturing capacity for precision timepieces been available in this country to meet both the demands of the military agencies and the needs of the essential civilian and war-supporting industries and institutions. Following are listed some of the war-supporting needs that the records show were inadequately filled during World War II:

1. Railroad, aviation, and transportation timepieces.
2. Communications timepieces.
3. Medical timepieces.
4. Industrial timers, industrial process control, standards work, geology and mining, food processing, etc.
5. Research laboratory timepieces.
6. Commercial marine timepieces.
7. Time-element components of industrial equipment.
8. Repair and maintenance of existing timepieces.

Numerous examples can be cited to indicate the hardships, and frequent production losses, engendered by lack of timing devices. Shortage of precision decimal timers for industrial use was a chronic problem throughout World War II. Military demand for jeweled timers was so great that few could be released for industrial purposes. According to WPB records, "Many of the large industries in this country who were converted to 100 percent warwork were severely handicapped by the lack of these timers * * * in June of 1944 several thousand units were produced by one of the jeweled-watch factories. This helped the situation materially but the situation quickly changed * * * and in July they were again busy making these items for the Air Corps. During the fall of 1944 the situation again became critical and it was necessary for us to secure a setback on a Navy contract to provide 250 units for release for industrial purposes during the month of December." Some measure of the requirement for these timepieces is indicated by the fact that on just 1 day (May 4, 1945) the War Production Board received 46 requests for directive assistance involving 750 timers, of which 729 already carried an AA–1 rating. Industrial timers continued under direct War Production Board allocation until the closing weeks of the war.

On February 10, 1943, War Production Board release No. 2496 appealed to the general public for the loan or sale to the Government of railroad watches. Limitation order 175 was issued in August 1942, and in each succeeding reporting period the backlog of unfilled certified orders increased. When the order was revoked in May 1945, this unfilled balance was 18,235 units. In July 1943 there was a critical unfilled demand for 300,000 watches for hospital use. It was decided to use nonjeweled watches with conventional second hands, in place of the sweep type normally used on nurses' watches, to fulfill this requirement. It was believed that these 300,000 watches could be produced in a relatively short time. Due to the volume and urgency of warwork being done by the nonjeweled-watch industry, however, only 140,148 units had been delivered by the end of the year.

In the spring of 1944 the shortage of miners' watches became critical. After much effort the War Production Board obtained 17,324 nonjeweled pocket watches which were turned over to the Mining Division (WPB) for distribution. In November 1944 an additional 1,000 units were assembled specially from semifabricated parts and were also directed toward this same need. It is interesting to note that of these 1,000 watches to be allocated to miners, a total of 502 were diverted to the Army Engineering Corps for overseas military use, and it was not until May 8 of the following year that additional watches were secured for the Mining Division.

These important shortages for precision timepieces for essential civilian use occurred in spite of the importation of approximately 29 million jeweled movements from Switzerland during the war period (1942–45). The shortage of repair parts became so acute that in late 1944 the State Department had to arrange with the Swiss Government under the compensation agreement for the importation of $350,000 worth of needed watch parts. In the planning for future mobilization, it would seem questionable to place any reliance whatsoever on a foreign source for precision timepieces.

Based on World War II experience, and considering postwar population increase and industrial expansion, it is estimated that in a future emergency a minimum of 3 million jeweled timepieces per year would be needed to meet essential nonmilitary requirements.

COMMENTS OF DEFENSE DEPARTMENT REPORT

The Commerce Department has maintained over the years a very close relationship with the operations and problems of the domestic jeweled-watch industry. As evidenced from the above statements, considerable historical data is available in the Commerce files on World War II, Korean, and post-Korean situations regarding jeweled watches and allied products. It is, therefore, considered an obligation on the part of the Commerce Department to make certain observations on the Defense Department position which seems somewhat contradictory in the light of this past experience.

The impression is gained from the tenor of certain statements in the report that the Department of Defense position is predicated on an assumption that "sufficient capacity will remain and can be used for current procurement," and that the immediate position of this industry is not sufficiently critical to result in prompt dispersal of the domestic manufacturing facilities if remedial measures are not taken. It would appear from the facts available that any such assumption is dangerous. Drastic reductions in the work force have occurred in the past few months, and future reductions in man-hour production of jeweled movements have been officially published. All of the companies involved have stated that their domestic production of jeweled movements is currently operating at or below the break-even point, and will be suspended as soon as governmental decision relieves the respective managements of moral responsibilities for the national welfare in time of emergency. It would certainly appear that any conclusion in this problem should be based on a detailed analysis of the impact of the loss of these domestic facilities.

In view of past experience it would seem that the planned requirements for military timepieces as stated in the Defense Department report are dangerously low. During World War II, 3.6 million jeweled movements were supplied to the military by the domestic watch industry and 2.4 million imported movements were diverted to the Armed Forces and recased where necessary for military use. The constant demand for additional production and the application of high priority ratings and directives to obtain critically needed timepieces certainly do not indicate that "overprocurement and unnecessary issue of watches" occurred. The requirements for jeweled movements described in the Defense Department report are approximately 15 percent of the total used by the military during World War II.

The report further states that all other current or planned military production for this industry cannot be considered unique because companies outside of the industry have produced, or are producing, the same or similar parts. No detailed assessment has apparently been made, however, of the current absorption and probable absorption during full mobilization within this industry of both prime and subcontract work on military end items. It would appear that such an evaluation of the contribution of this industry to the Defense Department program would be necessary in determining the time consumption, cost, and dislocation engendered by the transfer of this work to companies outside the jeweled-watch industry.

The following tabulation represents in summary form a conversion of the programed military requirements of the jeweled-watch industry in terms of manpower required. Prime contract figures were derived from the Defense Department report, subcontract levels have been conservatively estimated on the basis of current subcontracts absorption in the industry, and man-hour estimates on the various items have been based on industry data.

Estimated manpower requirements for military program

Item	Total man-hours	Man-hours per year	Workers
Military timepieces	8,019,360	2,673,120	1,070
Fuzes and related devices	64,809,990	21,603,330	8,640
Subtotal			9,710
Subcontracts: Estimated to be 16 percent of prime contract level			1,550
Total workers required			11,260

The above total of estimated manpower is almost equivalent to the total manpower peak reached during World War II. It is apparent the transfer of this amount of military procurement, especially considering its precision nature and skilled labor content, would constitute an enormous undertaking and would most certainly jeopardize the mobilization planning for military requirements. It should also be pointed out that the above tabulation does not include manpower requirements for certain items, currently being produced only by the horological industry, for which production allocation planning has not been accomplished.

The statement on page 2 of the report regarding the performance of research and development work within this industry seems to indicate a potential area of contribution to the defense effort. No analysis is presented of the research and development contributions which actually have been and are now being made by the industry, nor of the future requests that may develop in this regard. Industry statements to the Commerce Department indicate that significant research and development contributions have been, and are being, made by this industry on the following critical, military programs:

(1) Improvement and standardization of mechanical time fuzes.
(2) Development of electro-mechanical and electrical time fuzes.
(3) Fuze miniaturization.
(4) Development of low-temperature lubricants for precision mechanisms.
(5) Development of timing release mechanisms for instrument parachutes.
(6) Development of gear-autosyn units for converter and radio magnetic indicators.
(7) Development of production methods for piezo-electric quartz crystals.
(8) Research on mass production of jewel bearings and developing domestic source for producing jewel bearings.
(9) Research on aerial cameras.
(10) Development of new types of timepieces such as break circuit chronometers, memory chronographs, and underwater watches for frogmen.
(11) Redesign and improvement of aircraft clocks.
(12) Research and development of gyro, safety, timing, and arming mechanisms for six types of guided missiles, including both ground-to-air and air-to-air systems.

In view of the fact that much of the above-mentioned research and development was successfully accomplished within the jeweled-watch industry in direct competition with companies outside of this industry, it would appear that loss of such facilities would be detrimental to the mobilization program.

CONCLUSIONS

The Department of Commerce is gravely concerned over the prospect of any action which would be detrimental to the continued existence of these domestic manufacturing facilities. This Department will support such remedial action as may be deemed proper, in regards to this industry, in order to preserve an adequate mobilization base from which wartime expansion can be accomplished to meet this country's needs in time of national emergency.

With the rapidly advancing technological developments which are so manifest today, and with the increasing trend toward more precision, automatism, and highly controlled processes; the skills and facilities of the jeweled-watch industry, which are so admirably suited for precision and miniaturization, should be recognized as being increasingly important and vital to the national welfare. In view of the historical role of this small and highly specialized industry, some of which has been cited in this statement, detailed statistical proof of its strategic importance should not be necessary.

Guidance can be obtained from the World War II experience of the British as described in Sir Stafford Cripps' statement before the House of Commons on October 16, 1945:

"* * * When the war came and we needed, naturally, to mobilize all the engineering resources we could muster, the inadequacy of the clock and watch industry left a very serious gap in what may be termed our industrial armoury. * * * If we had had a considerable watch and clock industry earlier, not only should we have avoided the risks which are inseparable in such circumstances from dependence on overseas sources, but we should have had a reservoir from which we should have drawn machine tools, skilled labour, and management well suited to the manufacture of many of those precision instruments upon which war so much depends today."

The Department of Commerce, with particular emphasis on its responsibilities for mobilization planning and assuring adequate production capacity to meet essential civilian needs, supports the position that serious damage would be done to the wartime strength of the United States if our domestic facilities for the manufacture of jeweled watches are permitted to deteriorate below the levels determined to be adequate for wartime expansion.

Mr. TEETOR. In any consideration of the essential nature of this domestic watch-clock industry, we must include the jeweled-watch manufacturers, the pin-lever watch manufacturers, the clock manufacturers, and the timing-device manufacturers.

Senator DUFF. Those are the components that constitute the horological industry?

Mr. TEETOR. That is right. They manufacture timing devices of all kinds, including highly critical military items.

We have depended upon this industry in the past, and we will undoubtedly have to depend upon them in the future to a very great degree.

Now, this morning we are considering only one segment of the industry. And that is the jeweled-watch industry. It is one of the more sensitive of the several parts of this horological industry. It is a very highly specialized industry. Its manufacturing facilities have been hurt by importations. And the same is true of the entire watch industry in this country. There are now four jeweled-watch companies making jeweled watches in the United States, and only four. They are the Bulova Watch Co., the Elgin National Watch Co., the Hamilton Watch Co., and the Waltham Watch Co.

Prior to World War II, these companies employed about 8,000 people. And during the war, it jumped up to around 12,000 people. The present employment is around 8,000 people, and less than half of that number are making jeweled watches.

This is a unique business. To produce these very small, tiny pieces—as you can see from these exhibits—and make them by the millions to close tolerances is an art that no other industry has in the United States. And not only is it an art to make the pieces, but it is probably even a greater art to make the tools that make the pieces—to make the little dies, the little cutters, the machines that make the tiny screws that you can scarcely see. Those tools used to all be made in Switzerland. We are making some of those tools here, I am told by the watch companies. They make many of their own tools. They still import some. But they are able to make them here. And that is the important thing.

They not only furnish themselves tools, but they make some tools for other industries that make similar small parts. So, they are important as not only the part manufacturers, but also as the tool manufacturers for the parts.

Now, it takes generations to build that skill. If we lose it, it is not something that you can just pick up overnight and start somebody else in the business, expecting to train them very quickly to do that sort of thing. It is a little like trying to train somebody to play a violin in a year. He may be able to play a little, but he will not play very much. It takes years to train people to do this sort of thing.

The Swiss now produce 90 percent of the world market for watches—jeweled watches. They produce 85 percent of the United States consumption of jeweled watches.

Now, the United States is the only significant source today of jeweled watches outside of Switzerland. A few other countries have small operations. They buy many of their parts from Switzerland, but the only source today that makes any large quantity of jeweled watches outside of Switzerland is the United States. The only way we have in the United States of protecting ourselves in quality and also on price is to maintain this industry.

It is rather easy to say, "Oh, we can get all the watches we need from Switzerland. Why make them in the United States? Maybe we can get them cheaper."

That is probably a fact. But as soon as there is a complete monopoly by Switzerland in making watches, we know what would probably happen to the price. And also the quality. We need to keep this industry here to provide the competition that is necessary in any free enterprise industry, any free enterprise market.

There was an Interdepartmental Committee report January 8, 1953, on this same subject concerning the problems of maintaining an adequate mobilization base in the jeweled-watch industry. They found at that time—that is, a year and a half ago—that we needed the highly skilled people in this industry for designing, engineering, tooling, supervising, and production work. They also found that long training periods were necessary, longer than in most industries; and that the work force cannot be rapidly expanded in this industry as in other industries. These skills can be maintained only by making jeweled watches. They cannot be maintained just by making the cases or making other kinds of devices. They have to work on watch movements or they are going to forget how.

Now, during World War II, the jeweled-watch industry was almost completely converted to warwork. They made 3½ million military timepieces. They made 4.2 million other delicate instruments, I am told. They also made 22 million fuses and 7 million fuse components. They made 350 million precision parts for other manufacturers. I think that is an important point. Some of these others that made precision instruments depended upon the watch industry for many of the parts that went into those precision instruments.

During the Korean war, they made 19 million fuses and 160 million precision parts that they shipped to others.

Senator DUFF. May I interrupt you just at that point?

Mr. TEETOR. Certainly.

Senator DUFF. To what degree was it possible to expand the number of those employed in this industry during World War II?

Mr. TEETOR. They expanded from about 8,000 to 12,000 production workers. That was about a 50 percent expansion.

Senator STENNIS. Were those skilled workers, that 12,000? I mean on the precision instruments?

Mr. TEETOR. Well, I could not tell you just what number of those were on the precision work, but the whole industry expanded to about that number. They also did a great deal of research work.

Senator COOPER. I suppose you make the argument that the whole industry would have to be preserved to preserve the essential skilled workers?

Mr. TEETOR. Yes, sir. I would say that they must maintain a balanced work force to maintain that skill.

When we had trouble with our shells, working with worn guns, and they had to redesign the Junghans fuse, the jeweled watch manufacturers did that. They developed and designed the first combination point detonating and mechanical time fuse. And they developed a method of waterproofing fuses that were rusting in naval service.

They developed, or helped develop, the first fuses for armor-piercing shells. So, they were very much "up to their neck" in research and engineering work that was required by our military forces.

They supplied critical jewel bearings, not only for watches, but for many other delicate instruments that require them. I would like to dwell on this matter of jewel bearings for just a moment. I had no idea how many jewel bearings it took to keep this country supplied, but I am told it takes about 150 million jewel bearings a year. We make a very small percentage of those in this country. Most of them come from Switzerland.

I am told that it takes about 5,500 jewel bearings for one of our bombers. It takes around 1,500 jewel bearings for a jet plane. Those jewel bearings are made to very close tolerances, and so far we have not been able to replace them with anything else. It just takes those kinds of bearings. Nothing else will work.

We do have a small plant in this country now making jewel bearings. It is a very small quantity, subsidized by the Government and it is comparatively expensive. Apparently the Government thought it was necessary to have that small plant. Now then, if we had to increase the quantity of jewel bearings quickly, the watch companies are the only companies that could do it. They have the machinery; they have the "know-how."

Senator DUFF. If the commerce with Switzerland were interrupted, would we be able to supply these jewel bearings?

Mr. TEETOR. We would be able to supply some of them.

Senator DUFF. In the quantity we would require?

Mr. TEETOR. I doubt it. We would have to increase production greatly.

We got millions of jewel bearings from Switzerland during the last war. If we could continue to get them from Switzerland during another war, that would be fine; but how do we know we could do that?

Senator DUFF. That is what I was asking.

In such an event, would our own industry be able to supply the quantity needed under the present setup?

Mr. TEETOR. There would be a shortage. But what we are making now could be greatly enlarged by the watch industry. And that is where we would have to look for such enlargements. We would have to do it some way.

When we increased the firing velocity of rockets during the Korean war, a new fuse had to be designed and developed and produced. And that was done by the jeweled-watch industry. They made quite a con-

tribution. And in the production of crystals for communications they again contributed much in research and production. So, we have leaned heavily on this watch industry; more than I ever realized. We just cannot take that lightly. We have to realize that they are a very important link in our military preparedness. Not only do they make other kinds of devices, other than timepieces, but during a war, timepieces are pretty important. It takes lots of watches to keep this country going. It takes lots of watches to keep a war going. We have always relied heavily on foreign sources, but for us to plan that way in the future is pretty risky. We have to keep our domestic facilities going. And American watch manufacturers could fill our most essential needs if we keep this industry going.

On page 7 of our report, we list some of these needs for essential timepieces. Railroad, aviation, transportation. You may remember in World War II we sent out an SOS to the citizens: "Would you like to donate or sell your railroad watches to the Government?" We went to the people to get enough watches of that type and of that quality.

We had to have many communication timepieces, medical timepieces and industrial timers. I remember in our shop we had a very difficult time getting the stopwatches that we needed, industrial timers for time study work, industrial process controls, and research laboratory timepieces, time element components for industrial equipment, repair and maintenance of existing timepieces.

Those things only people who make watches can do. You cannot depend on anyone else for those kinds of things. And they are essential, as you know. There was a great shortage in almost all of these categories during World War II. And at that time we had access to a large foreign supply of watches. Now, if that source were cut off, as it very well might be, we would be in sad shape without our domestic watch industry.

On page 12, I have listed a number of the things that the watch industry has done in the development of devices for war. There are 12 of them. I think they are very significant. They have made a grand contribution. And we will just have to admit when we see the evidence in the jeweled-watch industry, the contribution they have made and are making is essential and important.

Mr. Chairman, I think that concludes my remarks.

Senator DUFF. You have confined yourself very largely to the jeweled watch phase of the industry.

Mr. TEETOR. Yes. I understand that that was what this committee——

Senator DUFF. No.

Mr. TEETOR. I understand that that was what the principal subject was.

Senator DUFF. Well, it is the principal subject; but we are also concerned with the nonjeweled watch industry and with every segment of the horological industry. Is it your opinion that not only the jeweled segment but all other segments are essential in the matter of defense?

Mr. TEETOR. Yes. I think that all segments of the watch and timing industry, the horological industry, are very important.

Senator DUFF. And the significance of your statement is that confining your statement to the one phase of the industry was merely because you wanted to emphasize that phase rather than deemphasize the others?

Mr. TEETOR. That is right. I think we cannot emphasize this one phase too much. And, furthermore, that is the section of the industry that I think is probably being hurt most these days. And it is probably deteriorating most.

Senator DUFF. Senator Cooper?

Senator COOPER. I don't believe I have anything.

Senator DUFF. Senator Stennis?

Senator STENNIS. Well, you say, Mr. Secretary, that these companies are deteriorating now. You mean they are going down financially and are not able to make a go of things because of this foreign competition? Is that what you meant?

Mr. TEETOR. Well, some of that, yes, sir. Although I think these companies will continue to exist from a financial standpoint. I mean they are deteriorating in their production of watches and timepieces.

Senator STENNIS. What is their financial situation? Are they up against the wall, so to speak? Are they making a profit and paying dividends?

Mr. TEETOR. I have not examined the statements of these companies, so I am not competent to answer that question, Senator.

Senator STENNIS. As far as you know they are making money and they are not in distress in any way?

Mr. TEETOR. Well, what they are doing is: they are going into other products, and they are importing movements to put in cases. They are staying in the watch business, but not watch manufacturing business. I think when they talk to you, they will be able to answer the questions.

Senator STENNIS. I wanted to know what you knew, though, because you represent a branch of the Government.

Mr. TEETOR. Yes. Well, I know they are going into other kinds of businesses.

Senator STENNIS. Well, in this strategic-instruments phase, what percentage of those that the Government used in defense or otherwise are produced by these watch companies? Do you have anything on that? What percent of these strategic instruments or fuses, for instance, and others, are produced by the watch companies? It has been testified that there were other manufacturers. I do not know whether they produce 90 or 50 or 10 percent.

Mr. STUART. You cannot answer that by saying that, of a certain instrument, 10 percent is produced by one or the other. But you can answer it this way: We all saw in the paper the other day where a balloon went higher than any other free-flight balloon. Instruments were parachuted down at certain levels. Now, the timing devices to release those parachute mechanisms were developed in the jeweled-watch industry. We read in the paper about the sparrow missile that is now going into production. The timing, arming, and safety device for this guided missile was the result of research done in the industry.

Senator STENNIS. But you are not able to give us an idea, an estimate, of the percent of these instruments that are produced by the watchmaking industry?

Mr. STUART. As complete instruments, no, sir; but I can tell you that for certain instruments, and for certain parts for those instruments, all of them are made in the jeweled-watch industry. And obvi-

ously the complete item without the essential part, even though it might be only 1 percent of the total, will not function.

Senator STENNIS. What I am trying to get at is relatively what is the picture with reference to the watch industry as compared with other industries that can make fuses?

Mr. STUART. Well, let me put it this way: As of June of last year, when you were pretty well at the height of your fuse-procurement program, I can tell you without divulging any figures, that 72 percent of all of the rear-fitting devices delivered under the contracts that were then under procurement had been delivered by 2 jeweled-watch producers. Another 14 percent had been delivered by one non-jeweled-watch producer. There were four other firms on the fringe, shall we say, of the horological industry who had produced the balance.

I can tell you that as of right now, for a certain arming device for a rocket that will be used in enormous quantities, there are four producers in the whole United States. There is 1 non-jeweled-watch manufacturer, 1 manufacturer of component timers and 2 jeweled-watch manufacturers doing the entire job.

Mr. TEETOR. I know what you need to know. These questions are good. Can other people take the place of these watch manufacturers? That is the basis of your question?

Senator STENNIS. That is right.

Mr. TEETOR. It is so much a matter of time. I suspect that given time, the Caterpillar Tractor Co. could make watches; but it might take several years, and the war would be over by the time they learned how. To be sure, other institutions can be taught, and some firms outside the watch industry have made some highly precious instruments—but have not made watches. Furthermore, companies like Eastman Kodak or other camera manufacturers, or Bendix Aviation, or firms like that, who might be expected to make these precision parts, are going to have jobs of their own to do if war comes. We can't just say, "Well, now, you are going to have to start a department to make timing devices here at this factory."

Senator STENNIS. That is all I have, Mr. Chairman.

Senator DUFF. Thank you very much, Secretary Teetor. We appreciate having your testimony.

Senator Purtell, at the outset of the hearing a number of the Members of the Senate and House filed statements stating their position. And I was informed that you desired to file a statement. And for that reason there was a notation on the record at the beginning that there would be a filed statement from you produced later to be in the record at that point. And if you have any further statements to make——

Senator PURTELL. First I want to thank you, Mr. Chairman, for permitting me to come before you who are serving on this committee. I had intended to read this statement. I had intended, as a matter of fact, Mr. Chairman, to elaborate on it a bit extemporaneously; but if you have already——

Senator DUFF. You are perfectly at liberty to proceed in any way you choose.

STATEMENT AND TESTIMONY OF HON. WILLIAM A. PURTELL, JUNIOR SENATOR FROM CONNECTICUT

Senator PURTELL. I would like to do it. It is a short statement. But I think perhaps I have some rather peculiar experiences in the manufacturing field that might be of some help in exploring this subject.

I again thank you for the opportunity of appearing here before you. This subcommittee's study of the essentiality of the American watch and clock industry to the national security is timely and of great importance. And I certainly mean that. It comes in a critical period when we are making a sober reappraisal of our defenses and the needs of the armed services, and will undoubtedly reveal the timepiece industry's irreplaceable contribution to the defense production.

And, Mr. Chairman, I want to call to your attention the situation that we found ourselves in in manufacturing when the Manhattan project was first discussed. We did not know what it was. I at that time was engaged in manufacturing. I at that time was, as a matter of fact, head of an organization of manufacturers. And I can tell you how critical it was when they came around and pleaded with us to release 1 or 2 men, toolmakers or skilled workers, and they asked us to please help them to try to get just 1 or 2 or 3 outside of the city, such as Hartford, an industrial city, or a city such as Bridgeport, a highly industrial city, or a State such as Connecticut.

They just needed a few, but they could not get those few, Mr. Chairman. And the reason for it was that we had not enough skilled people when we needed them. And that is exactly what we are faced with here, Mr. Chairman, unless we take some means to see that we do continue to have those skills available.

During World War II our greatest asset was the boundless production capacity of American industry. Every industry converted to defense production established its own degree of essentiality in the war effort. My own State of Connecticut became a veritable arsenal of weapons and materiel for the military, and we are justifiably proud of the results which were achieved.

But there are certain industries whose peacetime production, by its very nature, peculiarly qualifies them for immediate conversion to defense production in a closely related field. I am satisfied that one of these is the watch and clock industry. This is true because of its long experience in designing and perfecting instruments which measure time with great accuracy. It is only a short step, of course, from the manufacture of a watch or clock to the manufacture of the time fuse and other timing mechanisms.

I am sure it is in the minds of some people that this can be done over a relatively short period of time. As a manufacturer of 30 years' experience, Mr. Chairman, I want to tell you that that is not my opinion. It takes a long time to produce such things as are produced in the manufacture of watches.

It is not something that is acquired overnight. And when we talk today about the need or the ability to teach other people in time of emergency—Mr. Chairman, we simply have not had in the past the people available or the time available, in the Second World War anyway, or even in the Korean situation, to really do the kind of job that should be done. And we will not have any time in the future that

we are faced with war. Not only do we need the teachers available who have the skill, but we also need the time in which the unskilled can become skilled. And in my opinion, there will be no such time available, unless we retain those skills. Unless we retain those people with those skills in an industry where they can continue to use those skills, they will not be available. And we may well find ourselves faced, as was England and France, in this horological field without the ability or the means or the people available to make these necessary articles for defense.

Watch and clock manufacturing is one of the oldest industries in industrial Connecticut. In a sense it could be said that horology is a New England heritage. Factory methods were first employed in manufacturing clocks a century and a half ago in Connecticut. And I point this out, Mr. Chairman, simply to show that the skill is there in the watch industry, which particularly and peculiarly happened to be centered, I think, almost in Connecticut. While this event has been cited as the first instance of the mass production of peacetime goods, there is also respectable authority for the proposition that it was the first mass production of any kind of goods, and probably lent inspiration to Eli Whitney's subsequent manufacture of firearms with interchangeable parts. It was also in Connecticut, a half century ago, that enterprising clockmakers succeeded in miniaturizing clock movements to fit pocket watchcases. This produced the famous Ingersoll dollar watch, owned and used by millions of people who could not afford more expensive timepieces. And, Mr. Chairman, that required skill. And the people producing them had to have a certain skill to do it. This background is deeply significant. For generations the domestic watch and clock industry has developed and refined the science of horology. It has learned the special skills which are indispensable to the design and some aspects of the production of timepieces. It has solved the problems entailed in the tremendous volume manufacture of parts, many of minute size, which are held to uniformity and very close tolerances. In modern technological terms, this is "know-how" of a very high order which cannot be gained except by long experience.

It is this unusual combination of knowledge, skill and experience which the clock and watch industry is able to devote to the national defense in time of emergency. I well remember how quickly, in World War II, Connecticut watch and clockmakers stopped making timepieces and concentrated all of their ideas, energies and facilities on the manufacture of mechanical time fuses and a great many other war items.

The important thing is they had those skills and those facilities available. There was a need and we were able to fill that need. What well might have happened if we had not retained those skills and had work available for those people making watches so their skills would have been continued in use and made available to us in time of war?

In its inquiry this subcommittee will undoubtedly inquire fully into the wartime record of this industry and the reliance now necessarily placed upon it for the production of critical items. In my opinion the conclusion will be inescapable that the contributions of the American watch and clock industry establish its position in our defense industry as of the highest essential quality. I believe that so firmly. I have seen the need for it during the Korean war and I can foresee

the need for it even to a greater extent in any coming international problems facing this country.

Thank you very much.

Senator DUFF. Thank you very much. Senator Cooper?

Senator COOPER. No questions.

Senator DUFF. Senator Stennis?

Senator STENNIS. What is the situation with reference to this industry? Is it being curtailed now? Is it in distress?

Senator PURTELL. There are two types of distress. One might be financial distress and I am not concerned with that. That is industry's problem. There is another kind of distress and that is the elimination of markets where you do not have an opportunity to employ those skills.

That I am very much interested in. I think—I understand, as a matter of fact, that the situation today is that because of the importation and the extent of those importations of foreign works and watches, that our own people are being denied the markets in which they could sell the product to keep these skills busily employed and so today I understand—and I think you will have witnesses here that will testify to it—that we have a great deal of unemployment in that industry.

It is not that they cannot employ those people but it is true that they cannot employ them using the skills we have got to retain. They can make other stuff. England and France did it. It is not a question of whether these people will be out of work if they do not make watches but it is a question as to whether or not these people will retain the skills which we know we need so badly in wartime.

Senator STENNIS. As a manufacturer with firsthand knowledge of this thing that is what it boils down to in your mind—the continuity of the employment of these skilled people at skilled tasks and the training of new ones?

Senator PURTELL. That is true. I have had no experience in the manufacture of watches. My experience is in manufacturing but I have had to manufacture some very precise parts, too, and I know how essential it is to have these skills available and it is something that when we need them, we just can't go out and hire. That is what I fear, sir, if we do anything to continue, if we do not do something rather, to correct the situation facing the watch and clock industry today. I think we have to have those skills available and encourage them being available by seeing there is a market for their product.

Senator COOPER. Let us say there is a body of very, very skilled watchmakers. I do not know how many, take 3,000, who are really expert. If the competitive situation continues and these companies cannot keep in the business of manufacturing watches, would this body of say 2,000, 3,000, very skilled workers, would they be absorbed in some other industry which would use comparable skill so that those skills would be maintained in time of emergency?

Senator PURTELL. Very likely, Senator, this is what happens and this is the sad part. I do not know it requires any 3,000 skilled people. I think you have got a certain type, it can be testified to by representatives of the industry here who know better than I, but you have certain very highly skilled types of people, diemakers and fixturemakers and jigmakers essential and peculiar to their particular industry, but here is what happens: A good toolmaker, a good diemaker, a good tool-

maker of any type, if he finds that there is a shakiness in this industry and there has been evidence of it because of the way that industry has been treated, then if he can get a job in my shop where we can employ his skill as a toolmaker, he will come and work for me and develop his skills along the line I am using with tools and you have that group deserting the industry and nobody replacing them. You have to have the highly skilled fellow who has to make the tools, dies, and jigs and you have the varying degrees of skills down to the semiskills. But even in the semiskilled field, it is surprising the amount of time one must have to train that type of skill in this type of industry where you are working with very, very small pieces.

To answer your question, it is this: You do not have a continuing group coming into your field so that you can sustain that level of employment and those skills in the watchmaking industry. To the contrary, you will have a continuing number going out and not being replaced and you will ultimately deplete your market of those types of skills. Does that answer your question?

Senator COOPER. Yes, sir. Thank you, sir.

Senator DUFF. A statement of Hon. Harold D. Donohue, of the Fourth District of Massachusetts has been submitted and will be entered in the record at this time.

(The statement follows:)

STATEMENT OF HON. HAROLD D. DONOHUE, REPRESENTATIVE OF THE FOURTH DISTRICT OF MASSACHUSETTS

Because, after several years' study, I entertain the very deep conviction that the preservation and encouragement of the American watch and clock industry is vitally necessary to our national defense, I am grateful for the opportunity to present this statement.

My original interest in this subject began back in 1948 when I was consulted about serious difficulties being encountered by the Waltham Watch Co., of Waltham, Mass., which lies in the congressional district I have the honor to represent in the Congress. I spent a great deal of time and effort studying the problems of the company and the whole industry. I became increasingly aware that the problem of watch and clock production was not merely a local question or one of restricted importance. It is indeed a matter in which the entire Nation has a very real stake.

The jeweled watch and clock industry is one of the most vital industries to the national defense. It is obvious that without the most accurate timekeeping devices, the Air Force, the Navy, and our ground forces would be virtually impotent in modern high-speed atomic warfare.

It has repeatedly been authoratively stated, and never denied, to my knowledge, that the American watch and clock manufacturing industry, with its irreplaceable skilled craftsmanship, involves an indispensable contribution to our national security system. In this respect, may I now introduce some pertinent evidence. I read to you a letter, dated February 9, 1950, written to the Chairman of the Board of Directors of the Reconstruction Finance Corporation, by the Chairman of the Munitions Board, and I quote:

"DEAR MR. HISE: The Munitions Board has heretofore expressed to you the position and importance of the American jewel watch industry as a resource for national defense.

"You were informed that there are approximately 8,000 highly skilled workers in the industry and that the acquiring of the degree of skill requires from 2 to 10 years of intensive training. The essentiality of the maintenance of this nucleus as a basis for expansion in times of mobilization is apparent.

"The Waltham, Hamilton, and Elgin watch companies employed 100 percent of their capacity in Government work from December 1941 to August 1945, manufacturing such items as aircraft instruments, chronometers, fire-control watches, time fuses, etc.

"It is considered that the maintenance of at least a minimum level of operation by the Waltham, Hamilton, and Elgin watch companies is vital to the defense of the Uniten States and should be preserved.

Sincerely yours,

"HUBERT E. HOWARD,
"Chairman, Munitions Board,
"Washington, D. C."

The United States Tariff Commission, in a report issued in 1947, stated that, and I quote: "* * * Except for the existence of established manufacturers of jeweled watches of quality, the Army and Navy could not have procured precision time instruments of the high quality, and in the large quantity and in the limited time in which they did. In any future national emergency, the Army and Navy would again almost certainly be dependent upon such manufacturers. The continued existence of facilities such as these manufacturers possess may, therefore, be regarded as essential to the maintenance of our national security * * *."

There is also a letter in the files of your Senate Finance Committee written by Mr. Hubert Howard, then Chairman of the Munitions Board, early in 1950, and I quote from it:

"As I pointed out in my prior letter, the maintenance of a healthy watch industry is essential to the national security. In addition to the items which it alone can produce, the industry undoubtedly would be called upon for the production of other items for which it is not the sole producer. In view of this, it is our feeling that, as a matter of precaution against probable future needs, every effort should be made to prevent the dissipation of the productive capacity of the industry and to maintain it in a healthy condition."

At this point, may I recommend to your careful attention and urge the chairman to obtain for the committee's perusal a most impressive article issued by the Office of International Trade, Consumers' Merchandise Branch, in the United States Department of Commerce, entitled "Watch and Clock Making Revives in the United Kingdom"; it appeared in the January 16, 1950, issue of the Foreign Commerce Weekly. It is too long to be read here, but I would like to briefly summarize it for you. This study presents, without bias or prejudice, but with scholarly factual detail, the history of domestic watch and clockmaking in the British Empire. It graphically points out how the British recognized their unwise neglect of an essential national defense asset, and are, by Government subsidy, taking steps to effect its rehabilitation. Great Britain learned, from sad war experience, and, admitting past mistakes, is taking adequate measures to rectify them. It seems to me it would be well for us, in this particular instance, to be guided by their experience and follow their example.

Gentlemen, beyond these official references, there are multitudinous authoritative statements on the record from expert sources, which I realize will be placed before you, and I do not desire to unnecessarily prolong this hearing.

In summary, I believe a factual study of our domestic watch and clock manufacturing industry will clearly show the industry is disintegrating at a frightening pace, through no fault that can be attached to the management or employees. The study will also reveal the industry has never been accused of being inefficient in its manufacturing operations and techniques.

The basic reasons why the industry is disappearing from the Nation at an alarming speed are, in my opinion, quite clear, and they can and should be corrected. I realize, however, that the factors of foreign importation preventing an equality of selling opportunity in the American market of our own domestic industry are not properly the immediate concern of this committee, so I shall not develop that crucial phase of this problem. Nevertheless, I earnestly hope the committee findings will warrant recommendations to the appropriate executive agencies for corrective balancing of certain unfair and impossible to meet foreign import advantages.

This committee would not be meeting if you did not feel the increasing disintegration of the domestic watch and clock manufacturing industry was not a matter of grave importance to the Nation. God only knows when or where or in what manner the Communist challenge and scourge will ever stop. Patriotic wisdom imperatively dictates that we, as Members of Congress, take every precaution to insure adequate defense resources for the survival of ourselves and the free world. Precision timing devices are an essential and integral part of modern warfare instruments. To permit ourselves to depend for supply of them on one foreign nation that, in case of war, could be isolated from us in a matter of hours by the enemy would, I submit, be the height of foolishness.

I know that the members of this committee will carefully and tirelessly explore this problem with patriotic devotion and, at the conclusion of your investigation, I am confident you will recommend that measures be promptly taken by this Government to preserve our domestic watch and clock manufacturing industry because of its proven essentiality to the defense and protection of the American people in time of war.

Thank you, Mr. Chairman, and members of the committee, for your courtesy.

Senator DUFF. Senator Bowring is here, and she wants to make a statement, either orally or by placing it in the record.

Senator BOWRING. Thank you, Senator Duff. I would like to read my statement, if I may.

Senator DUFF. All right.

STATEMENT OF HON. EVA BOWRING, SENIOR SENATOR FROM NEBRASKA

Senator BOWRING. Within the framework of a realistic program of foreign trade, it is the hope and belief of a great number of Nebraskans that provisions can and should be made for the maintenance of a healthy watch industry within the United States.

Other witnesses who will testify on this subject are better prepared than I to explain how and why a substantial and economically strong watch industry, particularly those segments which produce jeweled watch movements in their own plants, is essential to the adequate military security and preparedness program of the Nation.

We in Nebraska, however, have more than a usual knowledge and interest in this subject, for in Lincoln, Nebr., is one of the large plants of the Elgin National Watch Co. This is 1 of the 4 American concerns which produce very small and very exact jeweled-watch movements, which is almost a precision industry within itself.

For my part, I should like to confine my comments to this Elgin plant at Lincoln, Nebr. During World War II, the importance of this precision business was brought emphatically home to the people of the United States, and particularly to those responsible for our national defense and military productivity. In recognition of the critical need for such production, the Elgin National Watch Co. established its Lincoln plant to augment its output. Lincoln, Nebr., was chosen for many reasons, but the most important being the availability of an unusually large force of well-educated and capable workers.

Under the guidance of specially picked supervisory personnel, together with a few highly skilled tool-and-die makers who transferred from Elgin, Ill., limited watch production was started in 1948.

This was the first time in history that anyone successfully produced watches in volume west of the Mississippi River.

At the outbreak of the Korean war, this plant, along with other facilities of the Elgin National Watch Co. was called upon immediately by the Armed Forces to produce complicated timing devices. The Lincoln, Nebr., Elgin plant proved to be a strategic central location. The company, with the backing of the Navy Bureau of Ordnance, added two additional floors to the plant. Today the Lincoln plant employs nearly 2,300 people, of whom nearly 1,400 are working on defense projects of the most intricate and detailed nature.

The Lincoln plant of the Elgin Co. has added much to the growth and prosperity of one of the very fine Midwestern cities. But of far

greater importance in the inquiry with which your committee is concerned is the fact that within this plant, with this highly skilled personnel and its specialized equipment, there is the capacity to meet a very great need in our overall pattern of national defense and military security.

Rather than to engage in technicalities or the statistics which are so common when questions of tariff and problems of international trade are under discussion, may I make a simple analogy. We are all familiar with the saying that for the want of a nail a shoe was lost. If ever the time comes when we are cut off from foreign sources of jeweled watch parts and related precision items which the jeweled watchmakers are capable of producing, we had better have a few of this kind of nails in our own national saddlebag and the capacity to shoe our own horse.

Thank you very much, Mr. Chairman. I appreciate very much your giving me this time.

Senator DUFF. Thank you, Senator Bowring. Senator Malone of Nevada has just come in. Do you wish to testify, Senator?

Senator MALONE. Mr. Chairman, if I may, I have no written statement, and I will just make a short oral statement, and then if I would like to rearrange it and edit it for the record. Could I do that?

Senator DUFF. Without objection, that will be satisfactory.

STATEMENT OF HON. GEORGE W. MALONE, JUNIOR SENATOR FROM NEVADA

Senator MALONE. Mr. Chairman, I want to say to you that the watch business, in my opinion, is no different than any other business. There are 500 of them that are in the same condition or on the way. The crockery business is practically extinct. The mineral business is only in business to the extent of direct Government help. The precision-instrument business is going out. I could go on. But it is a policy and a principle that you really should be concerned with, in my opinion.

It is all very fine to say that you are going to help all nations of the world and you are going to allow the work of the people of these countries to find a market here for their goods. But there is something we forget. You do not forget it, Governor. I know that. And you men on this committee have had experience in business of this kind.

The market for a product is all you have. I spent perhaps 15 years of my 30 years in the engineering business, in industrial engineering to a certain extent. You can create everything but the markets. If you do not have a market, you have nothing. So when you go in, whether it is a watch business or the mineral business or the crockery business or the precision-instrument business or the machine-tool business or the clothespin business, as in Maine, if you have the market, you have to find a place where you can compete in that market.

So, for 175 years or 160 years, Mr. Chairman, the policy of this Nation made it so that whenever anyone wants to go into a new business, and they had an idea that a business might be feasible, they could find it out in the timberland in Pennsylvania or the mountains of Nevada or down on the Mississippi River, or wherever they found it, whether raw materials that you used in this business and the labor was available, and the workers and the transportation and the power and the water and 10 or 12 chief factors that enter into feasibility, and

then maybe a hundred lesser factors, when they all added up in the judgment of a good industrial engineer, or just your own judgment, if it is a business you thoroughly understand, to compete with any other area in the United States paying the same wages approximately and the same taxes, and you could get the money there to build the plant, and the markets were available, and you could compete in that market, paying the same wage, same taxes, same manufacturing expense or production expense, then you were in business, after you got your factory built. You were making a couple of dimes.

Now, all you had to do was watch every area of the United States. You had to compete with every area of the United States. Because there is no law or anything that handicaps or helps you. You just pay the same wages or the same taxes.

Now, the reason for that was, Mr. Chairman, because we had a policy for 75 years that the Constitution of the United States calls a duty. We have to come to call it a tariff or import fee, and learn more about it as we go along. It is flexible now according to the law. And that made up the difference between the wage standard of living here, the wages and the taxes, and the factors of expense in production, and the chief competitive nations. So you didn't have to worry about that. That came in under your basis of cost. It did not come under your basis of cost. It did not come in unless you needed it. But it did not hold anything out, because if properly fixed it just represented that differential of cost due to the various factors like wages and taxes, and it gave really the imports an equal access to your markets. But it also gave the American producer equal access to the American market, so that you could not undersell him, on account of the tariff. That was paid in to the United States Treasury.

Now, as he raised his wages, and his factors equalled yours, the tariff of the duty went down, and if you were living about as you were it was automatically free trade. There was no question about it cf advantage one way or theo ther.

Now, what you have done, after 20 years, in my humble opinion, Mr. Chairman, is fixed it so that a man cannot, that he doesn't dare, go out and try to finance a new business, if he is subject to competition from low wage labor countries, because what he has to do is to then estimate or try to estimate what they can do in 75 foreign nations and bring it in in competition. It makes no difference what he can do in competition with the people in his own country, with their own standard of living.

Now, if there is a duty or a tariff that makes up part of the difference, and you are in business, or at least you could do business, you do not dare do it, because it is hanging over your head.

The Secretary of State tomorrow can make a deal and put you out of business, and you are just out there a thousand miles or 500 miles or 3,000 miles, in the case of our States out there, and you are just doing a land-office business. And you wake up some morning, and you are broke. And the Secretary of State broke you. But he could not do it without the Congress behind him. You have the law there.

You know what that law is. We just extended it for 1 year; I will just give you an illustration.

We just finished a report. I have a copy of it here. It would be very interesting to you folks if you would take a copy of it. You can get it in my office. We worked on it for 10 months. We found out in the

stockpile study that we furnished money to England. This is just an example. And they built up a large stockpile of zinc and lead over a number of months. And a year ago last March they suddenly released it, at whatever the market would pay here. It went down from 16 cents to 12 cents, and then 11 cents, and then 10 cents. And they could make money at 5 cents, because it was our money anyway, and anyway the labor cost was so small over there in Africa where it was produced,

But I want to tell you what it did to this country. I knew mining men that had millions of dollars' worth of zinc and lead ores. They had zinc ore at 16 cents a pound. At 10 cents it turned into country rock, and they didn't have anything.

Now, it is just the same with the watches and the clothespins and everything else. And, Mr. Chairman, without taking any more of the time of the committee, I think you should work on a principle. If you let those watchmakers go back into business on a basis of fair and reasonable competition, don't trade them down the river, as we have already to Switzerland. And that is where the watch is being made. That watch on my wrist and yours was made in Switzerland, if you have not had it more than 10 years, because they can make the works cheaper over there. So if you just put it over there on a basis of fair and reasonable competition and let the Tariff Commission, as an agent of Congress, fix that tariff, you do not have to worry about the watch business. They are back in business right now. And I know they have to know how to make watches.

There is one other thing here, and that is this. Your Senate Resolution 143 directed us to find out the availability of strategic and critical materials to this Nation in time of war. Your watchmakers know how to make fine instruments. Overnight you can turn them into making instruments for planes. And you might have to do it at any time. But you haven't got them. They are scattered.

So on a national defense basis alone, we have irreparably injured this Nation, Mr. Chairman.

So I think it is a very serious thing. It is much more serious than the watch business. It touches every business, that policy does. And in the watch business, then, the men who know how to make these things, these fine works, these machine tools and watches, you can turn right into a national-defense business. And, Mr. Chairman, it takes a lot to make a good machinist. I was a boilermaker's helper at one time. It takes a long time to make a good boilermaker's helper, longer than it does to graduate from college. It takes longer to make a good watchmaker than to go to college and graduate. And when you have gone to college and graduated you go out in the world and do not know how to do anything, but you are educated, and so you are pretty mad if somebody does not offer you a big salary. But if they spent that 4 or 5 years in a watch factory, and then got eliminated because of lack of special aptitude, after 5 or 7 years, they are watchmakers; and generation after generation we are destroying them.

That is all I have to say, Mr. Chairman. I have been saying it on the Senate floor now for 7 or 8 years, and I will keep it up.

Senator DUFF. Thank you, Senator Malone. Secretary Teetor was the last witness from the executive branch of the Government. I think that everyone who has heard the Government witness is impressed by the unanimity of opinion as to the essentiality of this business.

The next group of witnesses will be representatives of the American watch and clock industry. The members of the staff in their preliminary investigation made representations to the Chair and the other members of the committee of those that they felt important to be here.

The first witness, Mr. Bulova, has shown a reluctance to come without a subpena. But I advised the staff that I thought if I wrote him a personal letter and explained in my opinion the essentiality of his testimony, that the subpena would not be necessary although it would have been issued had it been necessary. But we are very pleased to have him here and to be able to secure his testimony which is so essential to the vital national-defense question before us. Mr. Bulova, it is O. K. with us for you to file this and talk extemporaneously or if you would prefer, to read this.

Mr. BULOVA. I prefer to read this if you do not mind.

Senator DUFF. You may go ahead, sir.

TESTIMONY OF ARDE BULOVA, CHAIRMAN OF THE BOARD, BULOVA WATCH CO., INC., FLUSHING, N. Y.

Mr. BULOVA. My name is Arde Bulova. I am chairman of the board of the Bulova Watch Co., Inc. I appear before you in response to a letter from your chairman requesting me to testify on whether or not the American jeweled watchmaking industry is essential to national defense.

May I respectfully ask that the letter which was sent to me be made a part of the record of these hearings?

Senator DUFF. It is ordered without objection that that letter be made a part of the record.

(The letter follows:)

UNITED STATES SENATE,
COMMITTEE ON ARMED SERVICES,
June 17, 1954.

Mr. ARDE BULOVA,
Bulova Watch Co., Jackson Heights, Long Island, N. Y.

DEAR MR. BULOVA: A subcommittee of the Armed Services Committee of the United States Senate will hold a hearing in room 212, Senate Office Building, Washington, D. C., on Monday, June 21, 1954, at 10 a. m., for the purpose of ascertaining the essentiality of the domestic watch industry to national defense.

As chairman of the subcommittee and after consultation with the other members of the committee it was felt that your presence at this hearing was imperative in order to afford the committee a full appraisal of the overall situation. It is our feeling that you ought to be a witness in these proceedings and as chairman of the committee I am passing on to you the strong desire of the committee for your presence at the hearing.

I hope that despite the shortness of the notice you will find it possible to be present.

Kindly regard this letter in lieu of a subpena as we did not feel it would be necessary to issue process for you in view of the desire of the committee for your presence and your testimony in order to give a rounded picture.

Respectfully yours,

JAMES H. DUFF,
Chairman, Preparedness Subcommittee No. 6.

Mr. BULOVA. I am impelled to request this so that there can be no possible misunderstanding on the part of anyone, in the United States or abroad, as to how or why I am testifying here today. This letter stated that my testimony was "imperative," the last paragraph indeed contained the line: "Kindly regard this letter in lieu of a subpena."

When a committee of the Senate of the United States makes such a request, any loyal American, any American concerned with our national defense, will respond and will present the fullest, frankest facts of his experience.

Let me begin with a few simple, but very important facts about the Bulova Watch Co. We are a publicly owned company. We are an American company, incorporated in the State of New York. Our stock is listed on the New York Stock Exchange and is widely held by American citizens in the United States. This is, of course, true of other American watch companies.

What makes Bulova rather unique, in the watchmaking industry, is this: We are the only company that operates manufacturing plants in both the United States and in Switzerland. We happen to be one of the largest producers of fine watches in the United States, and we happen to be the largest importer of jeweled-watch movements from Switzerland. Our strictly business interests, therefore, fall on each side of the classic question involving domestic production versus foreign imports.

The open and clear fact is that our company does not oppose Swiss imports. This would indeed be a foolhardy position for us to take. We depend on our imports from Switzerland for a large part of the volume of the goods we sell. We profit from the sale of watch movements which are made in Switzerland and which are cased in our American plants for sale to the American public. On a strict commercial basis our interest might normally be in favor of expanding our imports, rather than keeping alive domestic production.

May I remind you that the Bulova Watch Co. has never engaged in the commercial aspects of any of the tariff debates which have involved the watchmaking industry. We have not taken a public stand in favor of our domestic manufacturing operations in any controversy which might adversely affect the operations of our Swiss factories. This is because we could not risk the interests of our stockholders by offending the watchmaking industry of Switzerland and the Swiss Government—which, by law, regulates that industry. In this background, I believe I can speak with a certain degree of objectivity so long as any discussion is limited strictly to the relationship of jeweled watch manufacturing to national security.

My testimony may have relevance to your investigations for six reasons:

1. The domestic facilities of the Bulova Watch Co. were converted to defense work 100 percent during the entire period of World War II.

2. As soon as the Korean conflict broke out, our company was asked to undertake considerable defense work by the War Department and the Air Force.

3. Today, a sizeable part of our domestic facilities—in plant, personnel, production, research and development—is busy on defense contracts.

4. Our company is today one of the largest producers of time fuses, for military purposes, in the United States—perhaps in the world. Our company also manufactures torpedo heads, detection devices for guided missiles, mortar fuses, quartz crystals, mine detectors, and certain devices which are classified as secret by the Department of Defense.

5. In 1945, after World War II, the Government of Great Britain, sorely pressed and gravely concerned over the cutting off of its im-

ports of certain precision devices from Switzerland, invited me to establish watchmaking plants in England, to be subsidized by the British Government and operated as an industry essential to their national defense.

6. Finally, 3 years ago I testified before the Tariff Commission and said that I felt it my duty, as an American citizen, to warn those in authority that certain aspects of our national defense program were extremely vulnerable. I urged a thorough exploration of this situation and this danger. Part of that study is now underway, by this very subcommittee.

Let me start off with a categorical statement: Watchmaking defies classification as an ordinary form of manufacture. A watch-manufacturing plant produces, on a mass production basis, the smallest self-powered machine known to man—a machine that combines unparalleled precision and accuracy. Power and precision are produced within an area so tiny that other industries just cannot match these microscopic tolerances—unless they too go through the extremely difficult and time-consuming processes necessary to the establishment of a domestic jeweled watchmaking plant. Some nonwatch companies undoubtedly can make certain parts or perform assembly work on precision instruments—but all our experience shows that it is the jeweled watch industry they must rely upon to produce minute components on a volume basis with the promptness and efficiency that war mobilization requires.

ESTABLISHMENT OF UNITED STATES WATCHMAKING PLANT

Before 1930, the Bulova Watch Co. was primarily an importer of jeweled watch movements. In the late 1920's, when Bulova stock was first listed on the New York Stock Exchange, some of our banking associates shared with me a concern that some day, in time of war, the company might be cut off from its source of supply in Switzerland.

Therefore, starting in 1930, we undertook to build an American watch movement factory. This meant not simply putting up a building or buying a few machines. It meant finding, developing and organizing a staff of precision engineers with unique experience in the manufacture of devices of such fine tolerances as is known in no other industry in the world. It meant producing not only the incredibly delicate and complicated parts which go into a watch movement; it meant building the special tools and refined machinery which are needed to make the parts. It meant not only hiring workers; it meant setting up elaborate programs for training craftsmen whose skills could be developed only by years of slow patient irreplacable apprenticeship.

The first step in 1930 was the opening of a plant at Woodside, Long Island. At first, this new plant made only bridges and plates—the basic framework of a watch movement—the other parts being imported from Switzerland. Over the next few years, the plant added new production departments. By 1936, we were making our own pinions, wheels, pallets, setting mechanisms, dials, and hands.

After several more years, by 1942, we were making domestically all the parts for jeweled-watch movements except mainsprings and hairsprings. During the war we converted our facilities 100 percent to precision defense work.

Shortly after the war, we completed our integrated development by adding the manufacture of hairsprings and mainsprings. It took us almost 15 years to establish a completely integrated domestic plant for the manufacture of all the parts of jeweled watch movements.

As I look back on this long and complicated development, much of it accomplished during depression years, I realize how fortunate we were—and how difficult it would be today for us, or any other company, to duplicate this achievement in a similar length of time today or in the future.

It should be noted that, in 1930, we were able to draw upon the experience, know-how and technical skill of our own Swiss plants. We got most of the tools, dies, and machinery from Switzerland. We were able to induce 20 of our key technicians in Switzerland to come over to this country to train American workers in the art of watchmaking.

But such conditions which made possible the development of a single jeweled-watch factory no longer exists today. The Swiss, quite understandably in their own interest, have now forbidden the export of most of the tools, dies, and machinery required for manufacturing jeweled-watch, movements.

During World War II, the defense role of the Bulova Watch Co. was substantial in both weapons design and production including work on subcontracts. The manufacturers of aviation instruments, for example, ordered many parts from watch manufacturers precisely because they themselves could not manufacture some of the minute gears, pinions, springs, and other components needed in precision devices.

On prime contracts, in addition to military timepieces and timing mechanisms, Bulova produced vast quantities of aviation instruments—such as altimeters, rate-of-climb indicators, fuzes and parts, and jewel bearings. In producing these items, many of them entirely new and unfamiliar to us at that time, the Bulova Watch Co. met or exceeded 99 percent of its delivery schedules. I wish to present herewith a list of our production in World War II as a matter of record.

Senator DUFF. Without objection it will be entered in the record at this point.

(The compilation follows:)

During World War II, the Bulova Watch Co. manufactured the following items:

For Army Air Forces:
- 35,000 rate-of-climb indicators
- 35,000 altimeters
- 216,336 navigation hack watches
- 50,000 8-day aviation clocks
- 7,692 ammeters
- 2,000 gasoline injection pumps
- $75,000 value, watch spare parts

For Army Ordnance:
- 3,324,730 T–105 concrete piercing fuses
- 3,765,300 T–49 time fuses
- 3,000,000 T–48 time fuses
- 5,000,000 M–103–A1 gears for fuses
- 200 T–148 time fuses
- 505,000 W–88 B. D. fuses
- 350,000 M–120 bomb nose fuses
- 220,000 M–4A2 rocket fuses

For Army Ordnance—Continued
- 1,250,000 M–22 boosters
- 1,994,050 M–66A1 B. D. fuses
- 150,000 M–72 B. D. fuses
- 221,054 watches
- 416 M–72D telescopes
- 6,299 M–71D telescopes
- 300 M–71S telescopes
- 1,317 M–71C telescopes
- 175 T–116 telescopes
- 15 M–3A1) repair fixtures for panoramic telescopes
- 263 M–1918
- 18,331 M–70 telescopes
- 50 M–61 fixt. elbow telescopes
- 50 M–5 fixt. elbow telecopes
- 27 M–70Q telescopes
- 1,012 M–70G telescopes

For Army Ordnance—Continued
1,012 M–70H telescopes
1,400 M–6A1 elbow telescopes
1,450 M–71D telescopes
5,865 M–55 telescopes
2,150,000 firing pins
9,000,000 pinions
2,590,000 firing shafts
2,847,000 escape wheels
3,000,000 arbors
1,100,000 adjusting screws
1,700,000 hammers
3,967,000 center weights and shafts
$150,000 value, watch spare parts
For United States Signal Corps:
60 conoscopes
1,000 ammeters
For Defense Supplies Corporation:
3,000,000 jewel bearings for precision instruments.
For Defense Plant Corporation:
$700,000 value, machinery for making jewel bearings.
For Newport Torpedo Station:
Castings for torpedoes
Bronze pieces for torpedoes
Stock parts for torpedoes
For Ford Motor Co.: Precision parts for aviation instruments.
For Sperry Gyroscope Co.: Precision roller bearings for automatic range finder.
Total value of war items manfactured, approximately $48,000,000.

Mr. BULOVA. Our achievements in this field of miniature precision items and parts for the military were possible, in my judgment, only because the company had developed a full-scale watchmaking operation in this country. We had available not only assembly line techniques, but a well-integrated toolroom and machine shop and organized production departments, with trained teams of highly skilled research, design, engineering, and production workers. The combined know-how of these teams of workers made it possible for our company to deliver great quantities of high precision war work. This was also true, of course, for the other American manufacturers of jeweled watches, who had similar performance records in World War II.

RESEARCH AND DEVELOPMENT FOR NATIONAL DEFENSE AS DEPENDING UPON A WATCH MANUFACTURING OPERATION

There is another vital area of watchmaking operations and know-how that made major contributions in our World War II record, and is becoming increasingly important in current defense planning—and that is our research and development facilities which are an integral part of the watchmaking art. Let me give you a brief description of our own recent experience.

In December 1950, during the Korean conflict, our company established the Bulova research and development laboratories, now headed by Gen. Omar Bradley. The primary purpose of this organization was to assemble experts in the fields related to timing mechanisms to do research and development for the armed services exclusively.

As a watch manufacturer, we naturally had already a sizeable research department tied in closely with our manufacturing, toolmaking and engineering operations. Many of our key personnel from that department were transferred to the initial group of our new defense research organization. The skills and experience of a dozen Bulova watch enginners and technicians, from nine different departments in the Bulova Watch Co., were utilized, for example, in the first development of various guided-missile components. Their activities were coordinated by Bulova's chief watch engineer.

As the shortage of competent technicians in timing mechanisms became apparent, and as the volume of defense contracts increased, our company was called upon to expand its efforts into fields such as

aircraft control systems, gyroscopes, guided-missile devices, and ballistics.

We were informed by the armed services that we had a most unusual organization for research and developmental work, because we were able to combine the knowledge of theoretical scientists with a team of skilled watch engineers. We have had no trouble in attracting scientists of outstanding caliber to our research organization because we have yet to find an instance where the most complicated concepts of the scientist could not be translated into functioning mechanisms by our engineers and craftsmen.

The laboratories include scientists and engineers who have made important contributions, through individual and team research, in many crucial and diverse fields: Microwave development, pulse-circuitry computers, electronic instrumentation, miniaturization, solid-state physics, stability analysis, fire control, aerothermodynamics, and ultrasonics.

Our production of precision devices for weapons has increased steadily. Our research on future weapons of improved design has been consistently enlarged. Bulova's facilities are being used to a greater extent each month by the defense agencies of the Nation. Substantial expansion has taken place, accordingly, in the personnel, production and technical equipment of the Bulova research and development laboratories. During the past year alone, the staff of engineers has been increased more than fivefold.

This research and development is the outgrowth of our domestic jeweled-watch manufacturing organization and facility. It is only by using the highly developed skills required in the watch manufacturing industry that we are able to make this contribution. It is important that the training and the development of these techniques be maintained and continued.

JEWEL BEARINGS AND NATIONAL DEFENSE

Another illustration of the defense essentiality of this industry is the jewel-bearing story.

Jewel bearings are tiny synthetic sapphires or rubies. Their principal function is to provide a surface against which the moving parts of various precision instruments can turn with a minimum of wear, friction, and vibration.

Jewel bearings are indispensable in all types of aviation instruments as well as in precision watches and other timing devices. They have no substitute. They are also essential to the operation of precision instruments used in ships, tanks, planes, firing-control gear, guided missiles, and other war items. You may gain some idea of the vital role of this tiny item if I tell you that the instruments in a single large bomber today require more than 5,000 jewel bearings.

The manufacture of jewel bearings requires painstaking training and skill. The shaping and polishing operations must be done within tolerances of millionths of an inch. Few industries are adaptable to work to these tolerances. In fact, all the attributes of such production are uniquely characteristic of jeweled-watch manufacturers. When it became necessary to make jewel bearings during World War II, it was the domestic jeweled-watch industry which alone could design and operate the program.

Before 1940, facilities in this country for the production of jewel bearings were negligible, although two of the domestic jeweled-watch manufacturers had done some pilot-plant work. At the start of World War II, we were dependent almost entirely upon imports from abroad. There is a significant story behind this.

In late 1940, various defense agencies began some discussions as to potential military requirements. Early in 1941, our company was given to understand, by various defense officials, that no shortage of jewel bearings for the national-defense program existed, and that there were sufficient domestic facilities available to take care of any shortages that might occur in the event of war.

Despite these comforting assurances from responsible defense officials, I personally had felt for some time that the situation was critical. With the fall of France in June 1940, it seemed clear to me that it was only a matter of time until the Germans would cut off the supply of jewel bearings from Switzerland to the United States of America. Accordingly, during the latter part of 1940, I started negotiations with two Swiss technicians to come to this country to work for our company and establish domestic jewel-bearing facilities.

Difficulties developed in getting visas for these gentlemen. I requested the assistance of the Office of Production Management and other agencies. After numerous representations, made by high officials of our Government, these two technicians were permitted to leave Switzerland. They arrived in the United States on May 23, 1941. But they had been compelled to leave behind them all models, drawings, and engineering data of any sort.

These two experts immediately went to work for our company and in our pay. Working entirely from memory, with no drawings or models, these technicians began to design and supervise the making of a prototype of each of the 30 types of machines required for the processing of sapphire into jewel bearings. By October 1941, 2 months before Pearl Harbor, a pilot set of machines for the manufacture of instrument jewel bearings had been completed at our plant in Woodside, L. I.

We could not find American firms capable of manufacturing these precision machines, so we set up a special machine shop to make them. We also set up a special course of instruction for the key personnel of other companies who might in time be trained to use such machinery for defense production.

Meanwhile, events changed the attitude of officials in our Government. In June 1941, Germany forbade the Swiss to ship any jewel bearings to the United States. Planes could not fly because of the lack of jewel bearings. In August, our Government designated jewel bearings a critical material. In October, the Defense Plant Corporation was requested by the Army to order 10 sets of jewel-bearing manufacturing machinery—from the Bulova Watch Co. Each set was to be capable of producing 8,000 jewel bearings a day. We were requested to train key employees of various defense contractors, which we did.

I sometimes shudder to think of what might have happened if we had not gone ahead on our own, long before October 1941.

Let me hasten to add that the other domestic jeweled-watch manufacturers had also foreseen the danger, and were in a position to assist materially in the rapid expansion of facilities for the manufacture of jewel bearings in this country. Later, other companies also partici-

pated in this program. But they never reached the quality or the volume of production that the jeweled watch manufacturers achieved. The reason is quite obvious: Only watch companies, because of their unique training and experience, were able to lend themselves to this type of high precision production where tolerances must be maintained to millionths of an inch.

As an example, the United States Defense Supplies Corporation placed contracts near the end of 1942 with the eight companies which were participating in this program.

The 3 jeweled watch companies—Bulova, Elgin and Hamilton—were asked to make 7,595,000 jewels; the 5 nonwatch companies were asked to make only 1,200,000 jewels. This record speaks for itself.

And let us remember that the watch companies furnished the necessary machines, and the know-how, technical assistance, and the training of employees for the nonwatch producers in the establishment of production lines and methods.

Toward the end of World War II Bulova, Elgin, and Hamilton recommended a program to continue the domestic jewel-bearing industry. So did the War Production Board.

But these recommendations were not followed. Shortly after the war ended, the jewel-bearing production facilities of the three American watch companies were dismantled. Their machinery was shipped into Government storage. Skilled personnel were released or assigned to other duties.

Then, shortly after hostilities broke out in Korea, the Joint Chiefs of Staff decided it was necessary to reestablish domestic facilities for the manufacture of jewel bearings. The Air Force gave the Elgin Watch Co. a substantial contract for research and development on improved jewel-bearing machinery. In June 1952, the Army Ordnance Department requested proposals for the construction and operation of a plant at Rolla, N. Dak. The only companies, incidentally, which submitted proposals were the domestic jeweled-watch manufacturers. The Bulova Watch Co. was eventually awarded a contract to build and operate such a plant on a dollar-a-year basis.

This Ordnance plant is now in operation and being doubled in size. It trains Indians from the reservation situated near Rolla in one or more operations. The key supervisory and maintenance personnel have been supplied by Bulova—people who have been with us over 20 years. The plant is now producing jewel bearings exclusively for defense purposes.

Our present potential in Rolla is around 5 million jewel bearings per year. It is my opinion that military requirements alone in any full-scale mobilization effort would require at least 75 million jewel bearings per year. So we are making but a fraction of our needs.

Without the existence inside the United States of healthy, operating watch manufacturing organizations to supply the supervision, know-how, and skills for the development of any large-scale jewel bearing program, our national defense would be in danger.

I have touched briefly on a few aspects of my watchmaking experience, as it relates to our national security. The record shows that defense problems have been met and solved by this industry in the past, and those that are being solved today. For the future, in this

atomic age, I believe these problems will become even more challenging. This was brought out only the other day by Secretary of Defense Wilson, when representatives of the American jeweled-watch manufacturers were discussing with him the many precision items and parts presently being turned out by this industry. Secretary Wilson said that in addition to all of these items, he could not himself predict what new and presently unthought-of things the jeweled-watch industry might well be called upon to produce 3 years hence.

CONCLUSION

I am convinced from my 40 years of experience in the watch industry here and in Switzerland that a domestic jeweled watchmaking industry is absolutely essential to our national security.

As an American citizen, I can come to no other conclusion. Where the security of the country is involved, I must speak forthrightly and without fear of reprisal.

If, after examining the facts, you gentlemen and other Government agencies conclude that domestic watch production is not essential to national defense, that should be announced—officially and publicly. Then when the pinch comes, as it will in the event of another mobilization, I will not have to come down here and explain to this or some other investigating committee why it is impossible to do in 3, or 5, or 9 months what would take years to reestablish. If the Government were to make such a decision, it would be making a monumental mistake which could not be rectified in my lifetime or yours.

If the Communists should ever come into power in France, they would soon take over Italy and Germany, too. Then I warn you, a Switzerland surrounded by communism would become the high precision arsenal of Red Europe. That is why this same high precision industry must be preserved in the United States of America.

Senator DUFF. It is my understanding from your testimony that the Swiss Government has forbidden the exportation of tools or machinery for watchmaking?

Mr. BULOVA. That is right.

Senator DUFF. When did that become effective?

Mr. BULOVA. They started as early as 1934 to prohibit the exportation of tools and machines.

Senator DUFF. And is still in effect?

Mr. BULOVA. It is still in effect. In fact, I might say that right after the war broke out in Korea I felt that we would be called upon to produce some of the similar things we were producing during World War II. I happened to be in Switzerland at the time and I placed an order for $1,600,000 worth of Swiss equipment and machines, with the various manufacturers from whom we purchase in Switzerland. I was advised that I could not get the shipment of that equipment unless I agreed that if I brought it over here it would not be used for horological purposes. I had to sign the contract to that effect in order to get the machines for our defense work, and I will put one of them in evidence.

Senator DUFF. Without objection, that will be entered in the record.

(The document follows:)

CONTRACT OF SALE

Between the undersigned, namely: Henri Hauser, Ltd., Bienne, Switzerland, as seller, on the one hand, and the Bulova Watch Co., Inc., defense division, as buyer, on the other, there has been concluded this day, the following contract of sale, which will be based on the seller's general terms of consignment and payment:

Art. 1

Henri Hauser, Ltd. sells to the Bulova Watch Co., Inc., defense division the following machines:

Description:

25 Automatic Two-Spindle Profiling Machines, Hauser—Type 190.

Special Accessories:

6 Centering Microscopes.

25 Complete sets of cams with 2 working plates and 1 clamp.

25 Complete sets of blank cams with 2 working plates and 1 clamp.

Price: According to Quotation No. 124, dated 1/15/51 and submitted by Hauser Machine Tool Corporation.

Delivery 5 mach. ea. in Sept., Oct., Nov., Dec. of '51 and Jan. '52.

Art. 2

Conditions of payment: As specified in quotation No. 124.

Art. 3

The buyer of the aforesaid machines agrees to use the same only in its own factories for nonhorological production. The buyer also agrees that a representative designated by the Joint Commission of Swiss Watchmakers, which representative shall be an American citizen and resident, shall have the right to inspect the use of said machines by the buyer at such times as may be mutually convenient, and subject at all times to the obligations which the buyer may have with respect to contracts with the United States of America and any Government agency. In case the buyer shall no longer have use for the machines listed in this agreement for the production of parts used in devices or instruments required by the United States Government, the seller will be given first option to repossess the machines by purchasing them at a fair and equitable price giving due regard for depreciation resulting from normal wear and length of operating life.

Art. 4

Except for the special conditions stipulated in the present contract, the general delivery conditions of the seller are valid.

This contract is executed in four copies, one for each party, and a third for the Joint Commission.

The Seller:
HENRI HAUSER LTD.
HAUSER.

The Buyer:
BULOVA WATCH CO., INC., DEFENSE DIVISION,
DAVID C. STANBAUGH.

FEBRUARY 6, 1951.

Senator DUFF. To what extent did the Swiss supply fuses and similar devices to the Allies and Germans during the last war?

Mr. BULOVA. They supplied them exclusively to the Germans—no military items to the Allies. I happen to know Helmut Junghans—his father was originator of the Junghans fuse, adapted by the watch industry for use in our 500 Series fuses today here and in England. He told me as recently as last December he employed 30,000 people in Switzerland making fuses for the German Army during World War II.

Senator DUFF. What did they do in the way of supplying watches to us and the Allies?

Mr. BULOVA. They were able to work out a deal with the Germans to keep on shipping civilian watches to the Allies—you could not make a shipment out of Switzerland without having a German cer-

tificate for export. They occupied France and Italy. We had to have a certificate with every shipment. The Swiss negotiated with the Germans—because of the amount of production they were doing for the Germans in war materiel—to continue to ship us a certain percentage of our watches which were our civilian ladies' and men's watches. It might also be interesting to note that aside from the 30,000 watches a month for the pilots and armed services we made during the war in our United States plant, the Government took 20 percent of our imports because the watch factories could not produce enough timepieces. That was the condition during World War II.

Senator DUFF. What was the situation with reference to the jewel bearings during the same periods?

Mr. BULOVA. The Germans examined the frontier for any shipments of hidden jewel bearings, but it is of public record that many jewel bearings were smuggled out by diplomatic pouch.

Even so, it was necessary to set up this program in the United States. As a matter of fact, in 1940, it might be interesting for you to know, when I felt that we could not make jewel bearings in this country, first there was no facility for making the synthetic sapphire and I knew the Germans would not permit the Swiss to ship us that, I said I had to have a chemist who knew how to take aluminum oxide and produce synthetic sapphire. I instructed my associates in Switzerland, who are all Swiss, directors of that branch of our New York Co., to negotiate and pay $25,000 a year to any Swiss chemist or technician that had made synthetic sapphire before to come to this country. We would pay him $25,000 a year, insure his life for $500,000, and agreed when this emergency was over, the plant could be his. That was my deal. I found a man by the name of Dr. Chemetelin, French-Swiss, and we brought him over. He is the very man that made the installation. We, at that time, got into making synthetic sapphire. Linde Air Products is making it now.

We also brought over Mr. Bunter, a technician who knew how to build machines for manufacturing and processing synthetic sapphire into jewel bearings.

We brought him over on the same deal. We brought him here. He could not bring materials with him. He built one prototype of each of the 30 machines for the processing of those jewel bearings—he put them on the drawing boards and we produced these machines for the industry. That is how we made jewel bearings.

Senator DUFF. I believe the Chair was correct in understanding you as indicating the opinion that in the event of a Communistic uprising in Europe it would be very difficult for us to get either jewel bearings or jewel making machinery from Switzerland?

Mr. BULOVA. I am quite sure the Communists would not permit Switzerland to assist us.

Senator DUFF. That is another reason you believe in the absolute essentiality that the industry and its various components in this country should be kept at a high order.

Mr. BULOVA. That is the only reason I am here.

Senator DUFF. And also for the further reason the Chair understands on account of the extreme nature of the requirements and of the time it takes to obtain these skills it would be very difficult in a hurry to create any additional supply that might be necessary in an emergency here in time to meet the crisis.

Mr. BULOVA. It would be a very time-taking process.

We have an apprenticeship program, for example, that takes 4 years, and we have broken that down for the Labor Department in full detail.

I would like to file this 4-year apprentice program with you. That is our standard for training.

Senator DUFF. All right. Without objection, this will be entered as an exhibit in the record at this point.

(The document referred to will be found in the files of the committee.)

Senator DUFF. You have heard the testimony of the various witnesses on the part of the Government prior to your testimony. And do you completely concur in what the Chair believes is the unanimous opinion of the absolute essentiality of this industry for national defense?

Mr. BULOVA. Absolutely.

Senator DUFF. Without any qualification?

Mr. BULOVA. Without any qualifications.

Senator DUFF. Senator Cooper?

Senator COOPER. First, Mr. Chairman, I would like to say I have enjoyed very much the testimony of this witness. It has been a very interesting story and he is to be commended for the steps he took prior to World War II and the Korean war.

You state that in the event of mobilization, it is your belief that 75 million bearings would be required per year, I believe.

Mr. BULOVA. At least, yes, for defense only. That would not include all jewels that are required—there are about 150 million jewel bearings a year imported into this country.

Senator COOPER. At another point in your testimony you stated that during World War II contracts were awarded to several watch companies and several nonwatch companies which aggregated about, I believe, 9 million bearings. How do you explain this difference in need?

Mr. BULOVA. Well, since World War II they have added so many more instruments in the indicator and measuring fields and various things that require jewel bearings that they did not have before. I think instrumentation and guided missiles has increased by tenfold the jewel requirements.

Senator COOPER. Is there any capacity outside the jeweled watch companies to furnish the estimated 75 million bearings and if so what would be the relative ability of the nonwatch companies to furnish these bearings?

Mr. BULOVA. The nonwatch companies would never make any themselves unless we supervise, assist, and instruct as we did during World War II. The jeweled watch industry is capable of doing that and we did it at that time. We built up after a year a production of about three to four hundred thousand a month, but it was such a tedious job that it was difficult to maintain the workers on that work because it is all microscopic. Instrument companies used to wait at our doors for jewels to put them in the instruments because the instruments would not function without them and they have never found a substitute for sapphire jewels. They have tried glass and other things but there was no substitute to be found.

Senator COOPER. If these companies making these bearings go out of business, what would happen to the engineers who construct the tools to make bearings? Would they be absorbed in other industries?

Mr. BULOVA. Yes, they would be absorbed in other industries.

Senator COOPER. Would they be available to make these jewel bearings in time of war?

Mr. BULOVA. It is a strange thing. All industries talk about precision techniques: a typewriter is made with great precision, a sewing machine is made with great precision, a radio is made in great precision. They all talk about precision. Look at this to get the feel of what precision really is. Here is a watch movement that is smaller than a dime, containing 117 component parts and about 3,000 operations. These are the component parts that go into that.

Now you cannot see——

Senator COOPER. How long does it take to train a craftsman to make these parts?

Mr. BULOVA. First of all, a high precision toolmaker, we will put him on the simplest and largest operation and when he is on these we will gradually put him down to the smaller sizes of more intricate dies and tools. Sometimes he quits because it is stuff he must pick up in a tweezer that he cannot see. Lay this here in your hand, Mr. Chairman. That is a pallet of a watch. It has two jewel bearings in it. That is the thing that locks into this little escape wheel which regulates the time. That locks; you have probably seen the watches in motion. That makes it tick.

Senator DUFF. The miracle to me would be how you would make this get into there when it so small you can hardly see it.

Mr. BULOVA. That does and it regulates and transmits the power from the mainspring. The mainspring fits into this little barrel. It drives and transmits power to the wheel. They are driven by these little pinions stuck in the center of these wheels that drive one wheel and as the force strikes into the escape wheel or the escape wheel pinion this rocks back and forth with the balance and releases power which registers time on the face of the dial. This is a very intricate piece of mechanism. As a matter of fact, a pallet diemaker who can make that die is extremely rare. It takes 68 operations to produce this.

Senator DUFF. Is this wheel stamped?

Mr. BULOVA. It is cut out in round disks first and then these teeth are all milled out, cut out with cutters. As a matter of fact, as an indication of what a cutter can do I might show you this. For example, this is a 50-time enlargement of that little pinion that drives the wheel. If you look at that, this has six leaves and the diameter necessary at the root of this leaf is less than two-thousandths of an inch.

The little cutter that cuts those teeth is made by our toolmakers. I wanted to show you this because even a good technician like Mr. K. T. Keller, who was in our plant and saw our production and looked at our plant, said, "You can make anything here!"

Senator COOPER. I repeat; how long does it take to train a craftsman to do this type of work?

Mr. BULOVA. Ten to twelve years. For example, during the war we had a young man—a toolmaker—who had been with us many years. He was a pallet diemaker, he is still with us. Because of security reasons—he was not a citizen—they insisted that he could not work in our plant. So in an apartment house where he lived we arranged to set up a toolroom and tool shop in the basement and invested $75,000 in equipment so that he would not lose his ability and his talent. He

made our pallet dies that you see there, in the basement of that apartment house, because we had no one else to put on it. He is still with us. This man is available. He has since become a citizen and cleared and he is now working on——

Senator DUFF. You were willing to take more of a chance on him than the Government was with $75,000?

Mr. BULOVA. That is what we thought of his skill.

Senator COOPER. Are the skills used in the making of these parts which you pointed out here, are they the skills, are they needed to make the precision timing devices, whatever they are, I do not know what they are, that are used in weapons that are made today?

Mr. BULOVA. Yes. I think we can show you one of these things.

Senator COOPER. You have been making some of them, haven't you?

Mr. BULOVA. Yes, sir. Here is one example. You might look at that, Mr. Chairman. This goes into a missile. We make it for Kodak. Kodak came to us when they couldn't make it themselves. There are four flakes in there that are four-tenths of a thousandth of an inch thick. There is a platinum wire soldered to those flakes that is one-thousandth of an inch in diameter. That instrument has the ability to sense temperature to a millionth of a degree.

Senator STENNIS. Repeat that, please.

Mr. BULOVA. The flake to which this little whisker is soldered is four-tenths of a thousandth of an inch thick. The platinum wire that is soldered on there is one-thousandth of an inch in diameter. That and the chemical qualities of that flake enables it to sense a change of temperature to one-millionth of a degree.

Senator STENNIS. How far away?

Mr. BULOVA. It does not matter much. Within 3 or 4 miles, if there is a battleship or any object outside with heat to be sensed. It receives its direction from another mechanism that carries the impulses and directs the missile to its target. We are making them for Kodak.

Senator DUFF. You do not have to sight at anything, just start this on its way?

Mr. BULOVA. That is right. There are others. We have here—as long as it has been published in a United States magazine, the Sperry missile—this is a safety and arming device we are making for the Sperry missile. There is the story about it right there.

Senator COOPER. It has been released.

Mr. BULOVA. Sperry is advertising it. There is their ad. We are willing to leave this for the record. This is the timing device and this has a safety factor of one in a million. After 2½ years that the services experimented with other organizations looking for someone to make this, and some were trying to make it themselves, including Sperry. Finally, they brought it to us and our people solved the problem and we are making them and they are in production now.

Senator STENNIS. The Department of Defense brought that to you?

Mr. BULOVA. That is right. There are any number of other devices. I might say this. That 75 percent of our production is on defense items. In fact we have had to reduce our production of watch movements in this country from a million, several years ago, down to 350,000 this year, and we could not afford to make them here at all except for the fact that 75 percent of our overhead can be charged to the Government.

Senator DUFF. With all these fabulous new devices of various kinds they are all dependent in the final analysis on this kind of delicate mechanism for their operation?

Mr. BULOVA. No question about it. I think that we just have not got enough of this industry in this country if we were called upon for full mobilization and had to go into production on this type of instruments, I think there would be a shortage of our talent.

Senator DUFF. In view of the fact that one of those missiles can do what an army used to do it is reasonably necessary to keep them supplied with what makes them?

Mr. BULOVA. Yes, sir.

Senator DUFF. Senator Stennis, any questions?

Senator STENNIS. I am sorry I did not get to hear all this testimony. As the Chair knows, I had an urgent matter that had to have attention. I wanted to ask Mr. Bulova 1 or 2 questions now.

During the war, as you were questioned by Senator Duff, did you say that the only thing we got out of Switzerland during World War II was some of these small watches, wrist watches of an ordinary type?

Mr. BULOVA. Civilian. They could not ship tools or machines because they could not get a certificate.

Senator STENNIS. You got no machines out?

Mr. BULOVA. Not during the war.

Senator STENNIS. You did not get any precision instruments and all our mechanisms along that line were supplied by American manufacturers?

Mr. BULOVA. Yes.

Senator STENNIS. Were you manufacturing here then?

Mr. BULOVA. Yes, we were manufacturing 100 percent. We were converted 100 percent to war production.

Senator STENNIS. Was that when you came here or did you have a factory here?

Mr. BULOVA. The factory was started in 1930 and it took us at least 12 years before we could make all the component parts of a watch so we could make a complete watch movement—except mainsprings and hairsprings which came after the war.

Senator STENNIS. All these precision instruments we used during World War II, fuses, by whatever name called, had to be made here?

Mr. BULOVA. That is correct.

Senator STENNIS. And now modern weapons of course have stepped up many hundredfold the number?

Mr. BULOVA. For example, I would like to show you one thing we have recently undertaken to do. Dr. Draper, I have not met him, came to us, sent his technicians to our plant because he had a gyro he felt only watchmakers could make. This is a free gyro with a rotor three-quarters of an inch in diameter—runs on pivots—a new development Dr. Draper of MIT has.

I would like you to read this telegram:

> I am very glad to hear that the Bulova Co. is planning to build the integrated gyros. In my opinion, the watch industry can make outstanding contributions in the manufacture of small precision gyro units.
>
> C. S. DRAPER.

I would like to leave that here.

Senator DUFF. It is made part of the record without objection.

Mr. BULOVA. This little gyro runs in jewel bearings, not in ball bearings. We are on that job right now. We expect to have a prototype ready for them in the course of a month or 6 weeks for test.

He has had his technicians in our plant, looked over the things we are doing. We make our own diamond dies for drawing out wire for our hair springs.

Senator DUFF. Is it a correct observation to make, that with the requirements of today, with the type of fabulous new weapons and with the intricacies of their mechanism, the setup we had in World War II would be utterly inadequate to meet it?

Mr. BULOVA. Correct. That is the way I size it up.

Senator STENNIS. Where are your plants?

Mr. BULOVA. We have several plants. We have a defense plant right near LaGuardia Airport on Long Island. We have two buildings and employ about 1,500 people at Woodside, Long Island where we make our watch movements. We have another plant at Sag Harbor. We have set up a fuse production plant at Maspeth, Long Island. We have a watch case plant at Providence, R. I., and a plant in Valley Stream, Long Island. Then we have four plants in Switzerland.

Senator DUFF. All in easy reach of one hydrogen bomb.

Mr. BULOVA. Within the New York area. But they could not get our place in Providence. We have a nice plant in Providence, R. I.

Senator STENNIS. I was impressed about what Senator Purtell said about the men with know-how. You said you set up plants in North Dakota where there are fine people but I have not thought of them as being particularly skilled in watchmaking.

Mr. BULOVA. Here is why that was selected. When they made the proposal in regard to having to make jewel bearings in this country I suggested they make it in a rural district because it was difficult to keep people on this tedious work. In Long Island as fast as we could get them trained they would want to go some place else. Jewel bearings are so tiny and small——I have some here. These are shown in different kinds and sizes. These are jewel bearings.

Senator STENNIS. You were looking for oriental patience, is that right?

Mr. BULOVA. Yes. These people are used to doing beadwork, and in selecting people for our work we asked girls if they liked to sew or do brocade. If they do not like to do small things we cannot use them. These Indians are all high-school graduates. We found that they represent a pretty nice caliber of people, the young people there. The skills we needed come naturally by doing beadwork and sewing and so forth. We trained them each for a single operation, but the entire plant is under our technicians who have years of experience and our supervision. We have taken some of the local people and got them used to using the microscopes for checking and we have built that up. It has taken us a year and a half with the know-how, with the machines, our machines which we built——it has taken us a year and a half and we hope to arrive at a 5-million production perhaps for this current year. So we are a long way from home and we have doubled that plant capacity.

Senator DUFF. Five million of these a year?

Mr. BULOVA. Right. We can leave that here for the record if you like.

Senator DUFF. All right. It will be entered without objection as an exhibit.

(Display cards were filed with the committee as exhibits.)

Senator DUFF. We are deeply indebted to you. It was a fascinating presentation and if the other members of the committee feel as I do, you have done a great service to us in making this problem clear.

Senator STENNIS. You have businesses in Europe and here, is that right?

Mr. BULOVA. Yes, we have complete plants in Switzerland.

Senator COOPER. I assume, and I accept it, that in the watchmaking industry there is a group of engineers and craftsmen who perhaps better than anyone else and maybe the only ones who can make these precision parts needed in weapons, suppose that a good many of these companies go out of business and these workers are here.

Would they be preserved for this important work in some other industry?

Mr. BULOVA. Not very well. They lose their dexterity. They deteriorate and have to be retrained. When we were converted 100 percent to warwork during World War II our only domestic watch production was an order for military watches for about 30,000 a month. Our capacity in that plant is a million a year or more, a million three hundred fifty thousand probably is our capacity. We were working on a basis of 300,000 a year. The rest of our plant plus all those we could hire was converted to making other kinds of instruments. When 1945 came and the war was over, we were permitted to go back into production, and it took us 3 years to build up our production again to a million watch movements a year with the same people——even people that remained there on other jobs——to get back their dexterity and training, feeding the machines, checking the microscopic measurements, and so on. If you could walk through our plant you would see many people looking through a microscope or a gage doing a job, and you would realize it is different from all other industries. They do not use them in other industries whether they are making sewing machines or cameras. There is not that degree of smallness or microscopic tolerances that is routine for us like you see here.

When our people are trained they get used to it. They do not do this as a self-sacrifice because they like the work, love it like a girl likes to brocade, they do not care to work on larger work. It is fine, clean work. All our places are temperature-controlled and air-conditioned, acoustically treated ceilings, and the floors are waxed and polished every night. It is hard to believe production is going on. That is the type of work and they like to do it there. But if they are taken off—we train them for this certain operation, and we have tried to even upgrade girls that have been doing a certain job and put them on a hairspring where they could make $2 an hour instead of $1.60. After working on the first job a year or two they do not want the new job because it makes them nervous to attain a new skill. They are not interested in being promoted.

Senator COOPER. What other industry is there or is there another industry which mostly closely would approach this type of skill?

Mr. BULOVA. The nonjewel watch industry. They have the same types of skills and tool and die makers.

Senator COOPER. What industry other than the watch industry?

Mr. BULOVA. None.

Senator STENNIS. That is your flat statement, that there is no other industry outside the watch industry?

Mr. BULOVA. That is right, outside the watch industry, there is no other. We have worked for the Kodak people and I have seen some of the shutters they are making which is a nice job but it is just a shutter and the accuracy there is very, very high and very good. But when I lay down before them a movement like that and I asked them could they make that, they laughed, and said "I guess if we took long enough to do it we might." I said "You could do it if you had the right kind of machines and equipment. With your training here, you would arrive at it the same as we, but it would take years." But I say, we can make any one of their shutters and we can. We have the skill that can take this shutter on and make it for any of their cameras.

Senator DUFF. The commitee will recess until 2:15 at which time the hearing will be resumed.

(At 12:15 p. m., the hearing was recessed, to resume at 2:15 p. m.)

AFTERNOON SESSION

The hearing was resumed at 2:15 p. m.

Senator DUFF. The committee will come to order.

This afternoon, the Senate being in session, I imagine that we will have a pretty irregular hearing, because when the buzzer comes, we will have to go up there to vote. So I presume that there will probably be several interruptions, one of which may occur at any minute.

Our first witness this afternoon will be Mr. Arthur Sinkler, president of the Hamilton Watch Co.

I am assuming that the other members of the committee will not object to going ahead.

(Biography of Mr. Sinkler:)

ARTHUR B. SINKLER, PRESIDENT, HAMILTON WATCH CO., LANCASTER, PA.

Arthur B. Sinkler, born in Villa Nova, Pa., 1910. Graduated St. James School, Maryland, 1928; graduated University of Pennsylvania 1932, bachelor of arts. Employed by the Girard Trust Co., Philadelphia, in trust department, mortgage division, 1933–36; employed by the Hamilton Watch Co., Lancaster, Pa., 1936 to date, in following capacities: 1936–37, position adjustor; 1937–38, supervisor assembly department; 1938–41, supervisor technical service section (research division); 1941–45, foreman specialities assembly (navigational timepieces); 1945–47, foreman assembly research; 1947–50, director of quality; 1950–51, general manager, advance orders division; 1951–52, director of research; 1952–53, vice president in charge of manufacturing; 1953–54, executive vice president; 1954, president.

TESTIMONY OF ARTHUR B. SINKLER, PRESIDENT, HAMILTON WATCH CO., LANCASTER, PA.

Mr. SINKLER. Mr. Chairman and gentlemen, my name is Arthur B. Sinkler. I am president of the Hamilton Watch Co., and I am speaking on behalf of my own company and the jeweled watch industry, whose association is known as the American Watch Manufacturers Association.

I would like it understood, Mr. Chairman, that while my remarks will be confined almost exclusively to jeweled timepieces, I think it is

of extreme importance that the record show that the horological industry, including all segments of it, jeweled, nonjeweled, and clock, is what we are really discussing, and it is our opinion that no one segment of it is expendable, that we all must be here if we are going to fill our proper role in time of an emergency.

I have prepared a statement, sir, which has been filed with your staff, and in order to save time I will not read it, but there are one or two points I should like to bring out.

Senator DUFF. All right. Your statement will be entered into the record at this place.

(The statement follows:)

STATEMENT OF ARTHUR B. SINKLER

My name is Arthur B. Sinkler. I am president of the Hamilton Watch Co., Lancaster, Pa., and am appearing here on behalf of that company and the American Watch Manufacturers Association composed of the Elgin, Hamilton, and Waltham Watch Cos., who with Bulova Watch Co. have the only facilities in the United States for the manufacture of jeweled-watch movements.

These hearings are tremendously important to me, both as the president of the Hamilton Watch Co. and as a citizen of the United States interested in the continued well-being of this country. I have become deeply concerned in recent years because of the steady transplantation of watchmaking facilities from this country to Switzerland. I know that the skills and facilities needed for the manufacture of jeweled watches are unique and irreplaceable, cannot be easily expanded, and are absolutely essential to the proper defense of this country.

In 1936 I first went to work for the Hamilton Watch Co. in the assembly department. After considerable training I worked at the bench as a position adjuster on railroad watches. Later I became foreman of that department and then in 1940 was made foreman of the department which assembled, adjusted, and tested all navigational timepieces, including the marine chronometer. I worked at this job throughout the war and after the war became successively director of quality control, general manager of defense orders division, director of research, vice president in charge of manufacturing, executive vice president, and president of the company. This statement is based principally on my actual experience in the production of watches and timekeeping instruments for the civilian market as well as for the armed services.

Looking back to the late 1930's it is clear now that this country, despite the great threat to the peace which was apparent in Europe, was completely unprepared industrially for war. Both in and out of Government there was very little planning for the production of essential military items.

This was true with respect to the watch industry. Little advance consideration was given to the production of items essential to mobilization for war. Early in the war, while plans were being made for the production of airplanes, ships of all types, tanks, and other mobile units, little or no thought was given to planning for the timing mechanisms necessary for their operation. This is particularly shocking to me because I know that the planning and production of an accurate, intricate timing device is difficult and time consuming. At the outset of the war our work force was depleted by enlistments and through restrictions on materials which curtailed watch production. After the watch companies went to considerable pains to present this problem to the services, permits were granted allowing the completion of certain civilian watches in our production departments to hold our work force together while the plans were being completed for the production of the specialized timing devices needed for the Government. Our design section and the design sections of all of the watch companies were working day and night designing and planning for the production of specialized timepieces for all purposes. Once war had started the jeweled-watch industry produced specialized timepieces of some 19 types. In addition, it produced fuses, timers, instruments, jewel bearings, and parts and subassemblies of many kinds. A list of this production is shown in the following table:

World War II production of the domestic jeweled-watch movement industry[1]

[Quantity in units]

	Total industry production	Military	Distribution industry	Lend-lease
Marine chronometers	9,889	9,889		
Deck watches, 22 jewel	8,435	8,092		343
Chronometer watches, 21 jewel	22,946	22,187	330	429
Master navigation watches, 22–23 jewel	139,894	129,558		10,336
Railroad watches, 21–23 jewel	174,944	51,658	123,286	
Chronograph watches, 15–19 jewel	211,027	210,892		135
Comparing watches, 17 jewel	41,351	37,209	55	4,087
Pocket watches, 17 jewel	128,238	128,238		
Pocket watches, 9 jewel	117,813	54,420	500	62,893
Stop watches, 7–9 jewel	272,645	197,368	14,409	60,868
Wrist watches 17 jewel	500,097	497,097		3,000
Hack wrist watches, 16 jewel	759,209	745,010	2,237	12,052
Wrist watches, 15–16 jewel	410,008	410,008		
Wrist watches, 7–9 jewel	266,555	265,445	110	1,000
Elapsed time clocks, 21 jewels	30,084	30,084		
Marine clocks, 11 jewels	29,960	29,960		
Aircraft clocks, 15 jewels	146,359	144,353		2,006
Aircraft clocks, 7 to 9 jewels	173,178	169,806		3,372
Aircraft and tank clocks, 7 to 9 jewels	285,227	283,352		1,875
Gun camera timers	10,874	10,874		
Special timers	10,239	4,168	6,071	
Marine clock escapements	214,406	214,406		
Special escapements	62,574		62,574	
Altimeters	35,000	35,000		
Ammeters	8,690	8,690		
Drift sights	9,400	9,400		
Magnetic compasses	1,814,400	1,814,400		
Map measurers	89,860	89,860		
Rate of climb indicators	35,000	35,000		
Sapphire plug gages	3,052	3,052		
Speedometers	2,078,500	2,078,500		
Tachometers	9,510	9,510		
Telescopes	37,600	37,600		
Torque control mechanisms	16,110	16,110		
Mechanical time fuses	15,321,500	15,321,500		
Rocket fuses	220,000	220,000		
Delay fuses	6,323,800	6,323,800		
Boosters	1,250,000	1,250,000		
Fuse half blocks	4,312,300	4,312,300		
Fuse plates	1,280,740	1,280,740		
Jewel bearings	10,690,000	10,690,000		
Miscellaneous watch parts	24,000,000	24,000,000		
Miscellaneous fuse parts [2]	293,043,000	293,043,000		
Other precision parts [3]	52,606,000	52,606,000		

[1] Bulova Watch Co.; Elgin National Watch Co.; Hamilton Watch Co.; Waltham Watch Co.

[2] Escape gears, firing pins, and shafts, hammers, pinions, springs, etc. supplied to: Eastman Kodak, Eclipse Machine, Frankford Arsenal, National Cash Register, Picatinny Arsenal, Remington Rand, and numerous other firms. Incomplete due to loss of records.

[3] Arbors, gears, levers, pinions, screws, springs, etc. supplied to: Brown & Sharpe, Chrysler, Ford, General Electric, Kollsman Instrument, Minneapolis Honeywell, Raytheon, RCA, Sperry, Taylor Instrument, Western Electric, and others.

Altogether the jeweled-watch industry supplied to the armed services in World War II over 3,600,000 specialized timepieces, ranging all the way from hack watches to marine chronometers. In addition, 209,000 timepieces were supplied directly to essential industry.

There is a story connected with practically each of the specialized items that could be told by the presidents of the various watch companies who participated in supplying them. Personally, I would like to tell the story of the marine chronometer because it is so illustrative of the problem facing this industry today and the essentiality of this industry in the event of a national emergency.

Prior to the war the only marine chronometers in the world were handmade, originating in Great Britain and Switzerland. In 1939 the Navy became aware of the fact that its supply of chronometers was nearly depleted and requested bids for 100 of the instruments. The only bids received were from foreign firms, since no chronometers were then manufactured in this country. Of this order, only 13 were delivered on schedule—these were supplied by Great Britain. Of 62 ordered from Switzerland not a single one was delivered on time.

Under these circumstances an urgent plea was sent to all domestic watch and clockmakers requesting that they bid on the manufacture of marine chronometers. We immediately agreed to work on the plans and to prepare our estimates.

In August of 1940 an officer of the United States Naval Observatory visited Hamilton and stated that the Navy was anxious to obtain about 500 chronometers over a period of the next 3 years. This request was later withdrawn, but Hamilton continued making working drawings so that we would be ready in case of an emergency. When those drawings were nearly completed, the Navy again indicated interest and asked for bids on the manufacture of 125 chronometers to be delivered over a 3-year period. In May of 1941 we received the order for this quantity of chronometers with an option on the part of the Navy to increase the quantity to 500. From this tiny beginning the contract was extended again and again so that before the war was over Hamilton had manufactured and delivered over 10,000 marine chronometers to the United States Navy, Great Britain, and to the merchant marine—all this on an estimate as late as 1941 which claimed that 500 chronometers were all that could possibly be needed.

For the first time in history marine chronometers had been mass produced with interchangeable parts and with no decline in accuracy and quality. While the total annual world production of marine chronometers prior to World War II was about 500, by the end of that war our production exceeded that figure every month. The domestic jeweled watch industry was able to do this job in time only because we had the skills and facilities necessary to the manufacture of jeweled watches.

I wou'd like to submit at this time an exhibit documenting this story consisting of letters and memoranda which are found in our files giving evidence not only of the quality of the job done but of the urgent need for it.

During World War II the pressure on the procurement of timepieces was eased somewhat because the supply from Switzerland was not entirely cut off. Over 2,400,000 imported watches were diverted to the military by a WPB order during the 18 months' period from September 1943 to April 1945. After access to Switzerland was obtained near the end of the war, an undetermined additional quantity of watches was obtained directly from Switzerland for use in satisfying the demand for military timepieces. In addition, many of the essential civilian needs were met through the importation of watches and watch movements.

The "deal" that allowed the importation of these watches seemed satisfactory at the time but in retrospect it had many disadvantages. The Germans allowed the Swiss to send watches to this market and in return the Swiss industry supplied munitions, timing devices, fuses, delicate machine tools, and other equipment to the Germans. A statement that appeared in the Congressional Record on last June 11 recounts these facts in some detail. This source of supply in the event of another emergency cannot be counted upon. In the first place it is doubtful whether in another war Switzerland would be allowed to ship vitally needed watches to the United States. Secondly, it is foolhardly to rely on Switzerland for timepieces or any other essential items because of Switzerland's traditional policy of neutrality—a policy which led that country to supply timepieces and similar devices to both Germany and the Allies during the last war, and which keeps that country aloof from the current conflict with communism. A program of reliance on Switzerland for timepieces, jewel bearings, or anything else is inviting the unnecessary death of many Americans.

Statistics show that during the 4 years 1942 through 1945 the armed services purchased in excess of 6 million watches and other special timekeeping instruments which could be obtained only from the jeweled watch industry of Switzerland or the United States. In addition, there were essential civilian requirements by railroad workers, nurses, doctors, civilian defense workers, and others for a large volume of accurate quality timepieces. It is important to emphasize that these are not ordinary watches. Chronographs, marine chronometers, elapsed-time clocks, master navigation watches, and other specialized navigation timepieces are not produced at all during peacetime, but the civilian production of jeweled lever watches may be converted to the production of these instruments when needed for military purposes. Because of the complexity of the timekeeping instruments required and the changing nature of the demand, it is impossible to stockpile for these requirements or to call in civilian watches for these purposes. Watches are perishable in the sense that they require complete overhaul after storage and few civilian watches meet the rigid timing and service specifications of military watches. An attempt to call in marine chronometers was made during World War II, and I would like to submit a letter indicating that after some 3,000 requests had been mailed 9 chronometers had been accepted.

During the war and after the war the armed services and the various establishments responsible for the procurement of timepieces stated their position

concerning the essentiality of the jeweled-watch industry. In a speech delivered on June 16, 1943, Commodore J. F. Hellweg, Superintendent of the United States Naval Observatory, stated: "I wonder whether you fully appreciate the tremendous importance of your chronometer work. For years and years the United States has been dependent on European countries for all of our chronometers. Now, thanks to all you Hamilton people, we have thrown off the yoke. Never again will we pay tribute to the Europeans for our chronometers."

In a letter of December 5, 1945, Alden Crawford, brigadier general, United States Army, Acting Assistant Chief of Staff, stated: "The important part played by the domestic watch industry in the production of instruments of many types required by the Army Air Forces, as well as for other military materiel during the recent war is thoroughly appreciated by the Army Air Forces, and you may feel assured that recommendations have already been made to the Office of the Under Secretary of War that appropriate steps be taken to assure the maintenance of a sound jeweled and nonjeweled watch and clock industry in the United States for the purposes of national defense."

On November 30, 1948, Mr. F. C. Elliot of the National Security Resources Board stated to a meeting of representatives of the watch industry that upon the basis of the NSRB's study and a review of the final reports made by the War Production Board on its operations, the jeweled watch industry was one of the four most important industries in the country from the standpoint of national defense. The basis for this classification of extreme essentiality must still be in existence in the WPB files.

In a letter dated May 9, 1950, the Chairman of the Munitions Board stated: "The maintenance of a healthy jeweled-watch industry is essential to the national security. In addition to the items which it alone can produce, the industry undoubtedly would again be called upon for production of other items for which it is not the sole producer. In view of this it is our feeling that, as a matter of precaution against probable future needs, every effort should be made to prevent the dissipation of the productive capacity of the industry and to maintain it in a healthy condition."

On January 12, 1953, the Chairman of the National Security Resources Board sent to the President a report of an interdepartmental committee which the President had requested to study the essentiality of this industry. This report covered only the essential role of the industry in production of timepieces; it did not embrace the industry's essential role in production of jewel bearings or time fuses. The release states that "the study makes it clear that precision jeweled movements are essential to the security of the Nation in wartime" and that dissipation of the unique skills of the industry "clearly would not be in the interest of national security."

This reliance on the watch industry and recognition of the essentially of that industry has continued down to recent months. As recently as 1953 there were planned in the mobilization base almost 4 million watches and timepieces to be produced by the jeweled watch industry. For some reason no one has adequately explained, these estimates of requirements, which were based on actual World War II experience, seem now to have miraculously disappeared. For some inexplicable reason, it seems that we are once again being forced to blunder into a possible conflict without proper planning—and this only 12 years after we had an experience lesson on this very subject.

When we look at the contribution of the jeweled-watch industry during World War II, at the critical need for the production of timepieces of all types during that war, when we consider the statements made by the leaders of both services at the conclusion of the war, the statements of the Munitions Board and the National Security Resources Board, and the planning of the Defense Department itself for the mobilization base as recently as 1953, it seems impossible to reach a conclusion that, for the production of timepieces alone, the domestic jeweled-watch industry is not absolutely essential.

Fanciful speculation about the use of large quantities of cheap watches cannot alter the facts of history. Such speculation was prevalent before World War II and resulted in nothing but delay and confusion. A military barrage cannot be timed by a cheap watch or an airplane navigated with "mickey mouse" timepieces. The last war where seconds were important was not timed by throwaway watches and in this split-second age the next war certainly must not be. The fact is that there is no substitute for accurate quality timepieces.

For the same reasons, it is fallacious to talk of issuing fewer watches in another war. The demand will be for more, not less.

There are some planners in the ranks of the Pentagon, untutored by direct experience with the bitter lessons of the desperate character of this problem

in World War II, who are willing to engage again in the perennial peacetime theory that jeweled watches will not again be needed. But if and when war comes, these theories will again be supplanted by the demands of those who are responsible for the lives of our servicemen and the success of our military operations. If there is then no jeweled watch industry to supply the timepieces, it will not be the few theorists who suffer, it will be all of us.

I have limited my remarks to timepieces because other representatives of the industry will cover our activities in the production of jewel bearings, fuses, and related products. However, I must mention briefly the extremely important role of the research and development work of the watch industry. The strength and essentiality of an industry is measured also by its research and engineering capacity. All our companies constantly devote a large portion of their budget to this activity. Recent years have seen the development of special timepieces required to operate in all types of adverse conditions. Some must operate the programing devices of high altitude missiles where temperatures of 100° below zero are common. Others must operate 200 feet below the surface of the ocean under fantastic pressure. Still others must survive the punishing shock of being fired from a cannon in rockets or artillery projectiles. All must function accurately with a safety factor sometimes as great as one part in a million.

To perform these difficult research tasks the laboratories of the jeweled watch industry are equipped and staffed to handle all phases of research (physics, chemistry, metallurgy, crystallography, design, engineering and prototypes). A complete list of the research and development activities currently in process in the industry has been filed with the committee staff. Much of this work is classified, and cannot be discussed publicly. An examination of the exhibit by members of the committee will indicate without doubt the extreme essentiality of this portion of our industry. Our ability to successfully handle the work is the result of years of intensive study of miniature mechanisms requiring highly specialized training within the industry.

The United States has not been alone in recognizing the urgency of watch production in time of war. The British had the same experience, emphasized by the fact that their domestic industry had disappeared before the war. In October 1945, steps were taken in Britain to revive the industry. In the House of Commons Sir Stafford Cripps stated: "If we had had a considerable watch and clock industry earlier, not only should we have avoided the risks which are inseparable in such circumstances from dependence on overseas sources, but we should have had a reservoir from which we should have drawn machine tools, skilled labor and management well suited to the manufacture of many of those precision instruments upon which war so much depends today." The Government at that time adopted a program for rebuilding the watch and clock industry in Britain. After working on that project from that time until the present date and imposing strict quotas to assure the sale of the watches produced in Britain, the watch industry created by Government assistance has now reached an annual production of only about 54,000 jeweled lever watches. Britain, through a very harsh experience, has learned its lesson concerning the maintenance of a jeweled watch industry. The question is presented today whether the United States has profited at all by that experience.

The problem is not solely whether we maintain a jeweled watch industry capable of producing a certain quantity of quality timepieces. The decline in domestic watch production has been so rapid in recent years that this country is faced with the question of whether or not there will be any domestic industry at all in event of war. During this year fewer jeweled watches will be produced in this country than were produced here in 1936. Employment on the production of watches is less than in the years prior to World War II. Costs have already spiraled due to drastically curtailed production budgets. As the savings of mass production are lost, the competitive gap widens and the point of complete discontinuance of American production approaches. Speaking for the Hamilton Watch Co. and I believe for the other companies in this industry, I can state that we are not going to delay a decision on this question to the point where the continued existence of our company is endangered. It would be inexcusable to face bankruptcy rather than take corrective measures. Those corrective measures are apparent. All domestic companies now import watch movements to some extent.

When the profits from domestic manufacture have disappeared, domestic production will cease. The companies will continue as importers and make every effort through programs of diversification to find additional work for their employees. The facilities and skills which history proves to be essential to national

defense will no longer exist in this country. The neat refinements in questions of the quantities of special timepieces required by the armed services now discussed at length by the Defense Department personnel will then be answered. Unless our Government—now—takes some action to preserve our present facilities, there will be no American source for precision quality timepieces in any quantity.

Mr. SINKLER. First, Mr. Chairman, I should like to place in front of you, just so you may look at it as we talk, all the parts that are required to assemble a watch. A great deal has been talked about the timepieces that we make, and yet I think that we actually should be able to see them so that we know what we are talking about.

Our production during World War II consisted of a variety of timepieces. The one we hear most about, perhaps, is the marine chronometer, which was the standard time source used on all ships in the Navy. Without them, the navigator would not have been able to do his job properly; and we were told on many occasions that no ships could sail without the chronometers, and indeed we know that to be a fact. If you wish to see what the mechanism of the chornometer is, we have one in a plastic case.

The Hamilton Watch Co. was the first in production on marine chronometers, and before the war was over, although we did not get going until 1941, 10,000 of those instruments had been delivered. In 1943, when the Navy realized there was only one source, they asked the Elgin National Watch Co. to prepare and tool to make the chronometer, which they did, so that at the end of the war there were two sources.

Other types of timepieces which were produced by the industry were a chronometer watch in an especially mounted box of that kind, of which the industry produced 22,000, and there was another smaller one with a special 24-hour dial used by the Air Force, again with a shockproof box to protect it from vibration, 120,000 of those. The comparing device used by the Navy was produced in the number of 24,000. The trick on that watch is not that it doesn't look like any other watch, but that you can set the second hand. The quartermaster cannot carry the chronometer on deck with him, but he synchronizes the comparing watch with the chronometer and uses that as his source of time when he is making his celestial observation.

Complicated timepieces were required of the industry. This is perhaps the greatest monstrosity we were ever asked to build. It is known as the elapsed time clock. Our company, with Elgin, produced 30,000 of those before the war was over. It has a number of hands on the dial, which shows the civil date, elapsed time, in the course of flight from one point to another. It has a stop and start hand on it, or interval timing; all of which is controlled from the clock movement which is built in it.

Stopwatches have been referred to as being essential not only to the military but to industry during the war. Our industry produced 273,000 stopwatches.

Another type of stopwatch which was produced is the continuous running stopwatch with hour, minute, and second hand on it, in addition to the regular stopping mechanism. 211,000 of those were produced. If you want to see what the inside of that one looks like, I carry one in my pocket with a glass back on it, so that you can see the complicated mechanism that goes with it.

Of the wristwatches that we have heard so much about, that went specially to the Armed Forces, there were two types. One was known as the general purpose wristwatch. Our industry produced during the war 910,000 of them. That is a standard type of watch, except that it was made to very rigid timing specifications. The other type that was made is known as the hack watch which is waterproofed, and which has the same second setting device. That is, you can set the second hand on this one, just as you did with the comparing watch. That was used in the air, where the navigator's hands were usually so full of other things that to wear it on his wrist was of great importance to him.

All told, the jeweled watch industry produced special timing devices of this kind that totaled well over 3 million. I think three million-six was the actual figure, produced from 1942 through to the end of the war, two and a half years later.

The important part of all this talk about the jeweled-watch timepiece, the timepieces made by the jeweled-watch industry, is that they are not available anywhere else. There are four companies in this country today that can produce these instruments, and no one else.

We have tried to show that we are in danger. We mean that very sincerely, and I hope that your committee will be impressed with our sincerity in this matter, that we do not wish to cry alarm just for the sake of our profits, but we are here talking only about the essentiality of the watch-production facilities that we have.

Two points were brought up this morning that I should like to mention, if I may. The first was: Can the workers that we have in our factories be transferred to another type of job and keep their skills alive? I pride myself, sir, that I am a certified master watchmaker, although I have not worked at watchmaking for a number of years. I know that today I could not possibly do the work that I was able to do regularly in the course of my business 10 years ago. How long after I had actually stopped working at the bench and turned my attention to supervision and other problems of management, how long after that time I had actually lost the skill, I do not know, but I doubt that it lasted as long as 3 or 4 years. To regain it would be a task that I would not care to undertake.

It is highly important that we realize the necessity of keeping our skilled craftsmen working at watchmaking, because the tools that are required to make those tiny parts are so highly specialized that we cannot hire tool and diemakers; we have to train them.

The second point that I would like to mention is one that Senator Stennis raised this morning, about the financial condition of our companies. He asked if we were in good shape or if we were in bad shape. We make no bones about the fact that we are in business to make money, that our companies are financially quite successful. 1953, as a matter of fact, was the best year that my company ever had.

Yesterday, at the meeting of our board of directors, we discussed the various parts of our company as we always do. We had financial control charts, which show the performance of each division of our company, of which there are four. We have an allied products division, we have an imported watch division, we have what we call the fuse division, and we have the domestic watch division.

Yesterday, as it has been running for quite some time, our allied products division, which is our diversification program, showed a

profit. Our fuse division, which is still operating, showed a profit. Our import division showed a profit. But the domestic watch division, as usual, showed a loss.

We do not disclose publicly what part of our business is in watches and what part of it is in other products, but we will make no secret of the fact that our domestic watch division is now and has been for some time in a loss position.

I do not think that my board of directors will allow that to continue too much longer. No board of directors should. But in answer to the question that Senator Stennis raised, I thought it was important to emphasize that fact, that the domestic jeweled-watch business, that I can speak of, and I think the same goes for the nonjeweled, is in a loss position, and we cannot continue it.

I think, sir, that that brings out the points that I wanted to emphasize particularly in my statement, and I shall be very happy to answer questions if you have any.

Senator DUFF. Yes, sir. I think I understand pretty clearly what you have said. I might also say that it has been substantially in accord with what the other witnesses have indicated. Thank you very much.

Mr. Teviah Sachs, president of the Waltham Watch Co. of Waltham, Mass., will be the next witness.

(Biography of Mr. Sachs:)

TEVIAH SACHS, PRESIDENT, WALTHAM WATCH CO., WALTHAM, MASS.

Teviah Sachs entered retail jewelry business with Walter & Co., New York City, in 1919; gained complete experience in entire jewelry line, specializing in watch field. Before end of 10-year period with this firm was made senior executive.

In 1929 joined H. A. Osgood & Sons, New York, wholesalers of American watches—Waltham, Elgin, Hamilton and Illinois. Acted as general manager for the 3 years ensuing.

In 1931 went into partnership as American Watch Distributors in Rochester, N. Y., and New York City.

In 1935, at the time of the reorganization of Gruen Watch Co., was invited to take an important role in this reorganization. Was named vice president, assistant treasurer and director. During this period also acted as president, treasurer and director of Gruen Watch Co., Ltd., of Canada. Acting as the senior executive officer in the company under the president, was responsible for direction of sales, advertising, credit, general management and labor relations.

In 1941 went into business for himself as Sagold Co., New York, wholesaling of domestic and imported watches. In 1949 was invited to become vice president in charge of sales and advertising of Waltham Watch Co., Waltham, Mass., and after the company's second reorganization in 1951 became president, treasurer and director, in which capacities he is still serving.

TESTIMONY OF TEVIAH SACHS, PRESIDENT, WALTHAM WATCH CO., WALTHAM, MASS.

Mr. SACHS. Senator Duff, I am going to try to make as brief a statement as I can. I think that this meeting today has brought out so many of the answers to the questions that have been posed, and I would like to talk about the Waltham Watch Co. in preference to talking about the whole industry, and the importance it has in the national defense picture.

I have already filed a statement with the subcommittee. I have an additional copy of it here if the committee would like to have another copy of it.

Senator DUFF. Without objection, it will be made a part of the record at this point.

(The statement follows:)

STATEMENT OF TEVIAH SACHS

The Waltham Watch Co., as well as the three other jeweled watch companies in the United States, was entirely engaged (at the urgent request of the Defense Department) on timepiece and other critical defense manufacture during the entire period of World War II. This industry produced every type of the many and varied timepieces needed by the armed services during that time of national peril. The quantities of timepieces and weapon components which were called for were tremendous. Even using all the facilities available to it, the jeweled-watch industry was unable to meet all of the demands made upon it by the military.

In order to meet these enormous demands, the industry specialized in its production on certain timepieces, which could be made by no other industry in the country. For example, the Waltham Watch Co. produced differing quantities of the following types of timepieces:

Deck watches
Chronometer watches
Master navigation watches
Railroad watches
Comparing watches
Pocket watches
Stopwatches (pocket)
Wristwatches
Wristwatches (hack model)
Aircraft clocks
Tank clocks

Our company specialized, however, in the production of deck watches and chronograph watches, of which it made 100 percent of all produced by the entire industry for the Military Establishment during World War II, and in comparing watches (62. 3 percent), 7- and 9-jewel wristwatches (58.6 percent), 15-jewel aircraft clocks, and stopwatches (38.1 percent). The other watch companies also made many of these types of timepieces, and they, too, specialized in certain of them, making 100 percent of some in the other categories mentioned. I am very proud of the fact that the Waltham Watch Co. produced 26½ percent of the timepieces of all types delivered by the domestic jeweled watch industry during World War II.

But this cannot be done in world war III. With the new type of warfare that will be upon us if war comes, it certainly will be essential this time that no one company be charged with the responsibility of making all of any one model of timepiece. Because of the necessity to disperse production facilities, this cannot be done in the event of a world war III.

The manufacturing facilities of the jeweled watch industry are one of the Nation's important assets. As late as 1950, a study of the industry's capacity for timepiece production showed that Waltham Watch Co. had about one-third of the total facilities of the industry. Much of Waltham's machinery is the latest type of equipment; all of it is capable of meeting modern timepiece production requirements. An important part of the Waltham watchmaking machinery has been purchased since World War II.

The labor skills of the jeweled-watch industry are its most important asset, however; these skills are the national asset which will vanish if the industry ceases the manufacture of timepieces. I do not hesitate to predict that this cessation will come in the not very distant future, with the domestic jeweled-watch companies swinging entirely to importation of foreign watch movements, unless the administration takes action to preserve the industry as a manufacturing enterprise.

These labor skills can be preserved only through their constant use. As production increases, we are able constantly to obtain better production schedules because our skills then reach their maximum capabilities. Only by the constant use of these skills can the industry give its best possible production. The watchmaking skills, and the specialized equipment and the knowledge of using it in watchmaking, are, in my opinion, and in the opinion of many others, among the most critical of any in the United States.

After World War II, American watch companies had to reconvert to civilian watch production, in order to recapture a civilian market that had been taken away from them by virtue of their services to the Government during the war. All of the companies were faced with grave problems in this process. In converting back to civilian production the Waltham Watch Co. probably was faced

with more of these problems than the other companies, because of the new management which received control of the company in 1945. This management had to completely familiarize itself with the business in a short time. Because of new theories which it applied to the company, it was not able to get Waltham watches back into the market as quickly as the other companies, and so our company was caught in the sloughoff of business at the end of 1948. Because of this, the company got into a frozen cash condition, with topheavy inventories and not enough liquid operating capital to carry it. At the end of 1948 the company was forced, because of the conditions I have described, to file a petition in the Federal courts for a chapter X reorganization, which meant the cessation of manufacturing operations and a certain dissipation of the labor skills to which I have referred.

Fortunately the prime watchmaking skills were kept available for the company during this time.

The most critical skill in a watch factory is that of the tool and die makers, who must undergo a learning period ranging from 8 to 10 years. The Waltham Watch Co. had a large group of such people, and as a result of their great talent a great many of them were absorbed into other industries, using less than their entire skill in many cases. When the company again resumed its manufacturing operation, more than one-half of these people had already been absorbed in other industries and lost to the jeweled watch industry. Anyone who has one of these skills can go out and get a job in another industry, but when this occurs, I hasten to note, the skill becomes dulled and is not used to the utmost advantage. This is the tragedy that will occur if the watch companies cease their manufacturing operations. During the period of Waltham's reorganization, approximately 80 of these people with training experience of 10 years each were permanently lost to us at that time.

It has become increasingly evident that, without the help of this administration, the American watch industry cannot, under present conditions, continue the watch manufacturing phase of its operations and preserve the essential skills of the workers, in the face of foreign competition. It is imperative that the industry be declared essential and that every power of the administration be invoked to preserve it. During World War II the industry had almost 2 years in which to get to its maximum efficiency. It is certainly not expected that such a circumstance would occur again if the misfortune of a world war III came about. We must be alert, today and now, to preserve this industry, so that it will be ready on very short notice to serve the Government again as it has served our Defense Establishment in every war since the Waltham Watch Co., the first of the American watch companies, was established in 1850. I do not hesitate to point out and make clear that every American watch company established since that time has served the Government in time of war with the same zeal that Waltham has shown.

In addition to the tool- and die-making skills that are critical, there are many other skills which have learning periods ranging from 2 to 6 years in length. To point out most graphically what happens when skills are lost, the Waltham Watch Co. can call on its own experience during the temporary shutdowns which it has had. Even though the workers' skills were well-established and had been used constantly, a retraining period was necessary after each of these shutdowns. We found in each case, upon reopening on a restricted basis, that every skilled worker we brought back had to undergo a costly retraining period.

Secondly, an apprentice program is vital to the watch industry. Such a program is possible only if skilled personnel to teach the apprentice is available. Without a reservoir of skills in the industry an apprentice training program is impossible. In addition, I would point out that the retraining program to which I have alluded in the paragraph above could not ever be undertaken if the industry's basic reservoir of skills is dissipated.

In addition to the manufacture of conventional watches, there is a constant call by the Military Establishment on our industry for research and development of new types of timepieces for military needs. Without the basic skills in existence in the industry, a practical research program becomes an impossibility. During the last year, for example, the Waltham Watch Co. has developed a completely new timepiece at the request of the Department of Defense and has also produced it. It is a special type of clock, never before available, that is now a must on the panel board of every jet plane. We developed it, we manufactured the tools for it, and we produced it in 1 year's time. This could have been done by none other than a jeweled watch company, because only this industry has the ability to use the tools it has on hand, to make the new ones which are

necessary, and to utilize the skills our workers have developed. No other industry in the United States could produce this clock for delivery in less than 10 years' time if it had to start from scratch. More than this, we would say that even if we had given up all the machine tools and all the production tools necessary for manufacturing this clock, any other industry taking over those tools could not have produced, in any reasonable time, a clock like this that would perform. We say this because we know that no other industry has the reservoir of skills to utilize these tools properly. Certainly this is a critical and essential industry.

The drop in employment in the industry during the past few years, which is the direct result of overwhelming foreign competition, must be of vital concern to this Senate committee and to the executive branch of this Government as well. This drop in employment demonstrates without question the danger which confronts the industry and the country. In 1951 the four American manufacturers of jeweled watches employed an average of 8,151 workers on watch production; in 1953 they employed an average of 6,670 workers for this purpose, and in 1954 they will employ an average of less than 4,300 workers on watch production. Thus it can be seen that, in the 2½ years since 1951, domestic employment in the production of jeweled watch movements has fallen approximately 47 percent. This drop is certain to continue, and employment on watch production will diminish to the vanishing point in the not very distant future, unless action is taken on every possible front by everyone in this administration who is charged with responsibility for the preservation of essential industry.

I have dealt so far only with domestic jewel timepiece manufacture, of which the American watch industry is exclusively capable. In addition to supplying timepieces, the watch industry has been one of the prime suppliers of small precision parts for many, many different types of mechanical and electromechanical defense equipment produced by major prime contractors. For example, the watch industry has been a principal supplier, on a prime-contract basis, of mechanical time fuses. While companies in other industries have made valuable contributions to the production of mechanical time fuses for the United States Government, the principal supply of timekeeping parts for fuses which these other companies have assembled into finished fuses has come from the watch industry. If the jeweled watch industry ceases timepiece manufacturing operations, many of the skills which it has used in the manufacture of these time-fuse components will be dissipated and lost forever, and the Nation's capacity for the manufacture of mechanical time fuses inevitably will be lowered precipitously and to a point of danger.

In addition, the watch industry has been called upon because of its ability to work within extremely minute tolerances on a production-line basis, to supply parts for the instruments and components used in many weapons. Recently it has been engaged in a program aiming at miniaturization of instruments, which has become necessary in order to lighten the load in modern planes; our industry has been invited into this field because it is the industry most capable of performing many of these tasks in a short space of time. In this field the Waltham Watch Co. has produced an electric tachometer and a gyro during the last 2 years. These are important components of modern warplanes and of guided missiles.

At Waltham today we are developing new instruments which are seriously needed. I know that all three of the other American watch companies are also engaged in this important work.

The American watch industry also is rendering a great contribution in the establishment of jewel bearing facilities in the United States, one of the most critical needs in the whole field of instrumentation. These are facilities which we would not have in the United States at this time, if the watch industry had not been available to the Military Establishment when it desired to set up such facilities.

All these things that we are doing will be lost, will actually be destroyed, unless the industry is declared essential and unless every power of the administration is invoked for its preservation. A long line of important men in Government, in defense, and in security have already stated plainly and clearly that they would not want to be without a jeweled watch industry in time of war. One of the most experienced of these was James F. Byrnes, the wartime Director of War Mobilization. Mr. Byrnes stated in a letter of January 7, 1946:

"During the war the United States watch manufacturing industry was almost completely engaged in production of timepieces and precision instruments for the Armed Forces. The War and Navy Departments state that the United States

could not successfully have fought the war without these instruments, and further, that their production requires special skill which cannot be found in any other domestic industry. They state that the preservation of these skills is essential to our national security."

Certainly it is extremely important that immediate and forceful action be taken on the basis of all of these facts rather than the administration's merely acknowledging that they are true. This action must be taken today and now. If it is not taken, the manufacturing capacity of the jeweled watch industry will vanish, and soon, and the Nation will have suffered a serious loss.

Mr. SACHS. About a year ago, we had somebody come to visit us at our plant making a study of essentiality of the watch industry. It seemed a very peculiar question to me that anybody would have any question of the essentiality of the watch industry. I believe that the facts that are in existence are self-evident.

During World War II, the watch industry was taken over completely for the manufacture of war material, that is, the American watch industry, and they devoted all their efforts and time to the fulfilling of those tasks.

I would like to point out, too, that I believe that the watch industry's ability to supply the needs of the Defense Department was so limited even then, with all the industry working on it, that after World War II, when there was surplus property to be disposed of, there were practically no watches. All the watches went into use almost daily, as we were able to deliver them.

Since World War II, the Waltham Watch Co. has been called upon again to make watches for the Defense Department. We have made about 100,000 hack watches since World War II, since the start of Korea. We have made about sixty or seventy thousand airplane clocks since that time. So that how there could be any question as to the essentiality of the industry was puzzling to me.

We have four plants in this country that are able to make watches, timepieces. We should have more for an adequate defense base, in my opinion. It does not seem possible that we ever will have any more, because of the conditions that exist today. The industry is a constantly declining industry. In my opinion, the level of the industry at four companies is at an irreducible minimum. To have the industry at any level below four companies would be disastrous.

During World War II, the Waltham Watch Co. supplied 26½ percent of the military timepieces that were supplied by the domestic industry. We supplied 100 percent of the deck watches that were made. We supplied 62 percent of the comparing watches. We supplied 100 percent of one grade of pocket watch to the tune of 117,000-plus pieces. We supplied 58 percent of the wristwatches, 30 percent of the hack watches which amounted to 232,000 pieces, and 65 percent of the aircraft clocks.

Now, the Waltham Watch Co. has, as recently as 1950 when we last went over our records, about one-third of the United States industry's machinery and equipment necessary for the making of watches. In addition to general-purpose machinery, we have a lot of machinery that is peculiar to the watch industry, that no other industry needs or no other industry can use or that no other industry can make. A great amount of the specialized machinery at the Waltham plant was made by Waltham workers. We designed the machinery and made it.

I would like to say here that I have been with the company since 1949, which was after the war, but I do have at my disposal all the

records of the industry. In addition to that, for 35 years I have been in the watch business, and I have been very close to the watch picture, and I am very familiar with things that happened in the past in the watch industry.

Now, all these skills that we have accumulated to be able to make that single-purpose machinery are skills that we peculiarly have. As most people in this room probably know, the Waltham Watch Co. went through 2 reorganizations, 1 in 1949 and 1 in the year 1950.

Actually, as I analyze the situation, as I have the facts, which I have studied very carefully, one of the reasons that our company got into the difficulty it did was that it was unable to convert to a peacetime basis from being 100 percent on war business in all periods during the war, and we ran into a slough-off business just prior to Korea, and although we never were in any financial difficulty insofar as not being solvent was concerned, we were not liquid, and that was a problem that the new management had to take care of. I believe that we have established to everybody's satisfaction that we are.

Insofar as the manufacture is concerned, and as to some of the questions that have been raised here today as to whether there was any other industry that can do the things that our industry does: In my opinion and in the opinion of the people in our industry and in our factory, we believe there is a special reason why no other industry can do these things. And we say unqualifiedly that no other industry can, without an 8, 10, or 15 year period. Although other industries make instruments, they do not make them on a mass-production basis. We make the smallest instruments there are on a mass production basis. The instrument companies are run on a job-shop basis. That is a method of manufacture that is not as fast, it is not as accurate, and it is more expensive than the method of mass production manufacturing used by our industry.

I did not bring any exhibits with me, because my competitiors or colleagues brought a lot with them, and it would only be repetition, but the Waltham Watch Co. ever since 1952 has developed a miniature electric tachometer which has been of very great interest to the Air Force and the Navy. The big desire there is to lighten the load of a plane.

Just yesterday, before I left the factory, I had a letter from the Douglas Aircraft Co., thanking us for our contribution to the progress in making their new United States Navy Skyhawk, the A–4–D. This is a carrier-based plane, and the Navy had to lighten their equipment, and the Waltham Watch Co. was the company they came to. We developed a lighter clock than has ever been made for the panelboard, the board they fly by. We also developed for them a very important—so they say, and they are very pleased with it—illuminating arrange ment for this new clock. Now, they could not have gotten that anywhere except in a watch factory.

It is also true that no plane is supposed to be allowed to take off unless they have a clock on it.

Waltham Watch Co. developed a new elapsed timer for the Air Force last year. No jet plane is allowed to take off or be commissioned today unless they have one of these clocks on the panelboard.

In addition to that, we have developed an improvement on a gyro that was being obtained already from a first source. We were made a second source for this gyro. And from what I have been told by

the airplane people, our production time on a prototype was the fastest time, and it was the first occasion that this gyro has been produced on a mass-production basis. It is an important one. It is used in guided missiles, and it is used in planes.

During the last war, we had 2 years to get ready. The American watch industry today has lost so many of its skills that I doubt, if something is not done immediately, even if we had 2 years to get ready, that we would have an opportunity to fulfill this very important mission that we have in supplying the Defense Department with precision instruments.

Our factory is, I think, the outstanding illustration of what happens when you lose skills. During our second reorganization we had to close down for about 6 months' time. We did not get back 80 people who had been toolmakers. They went into other industries. They took other jobs. And we could not get them back, because of all the talk that is in the air to the effect that the watch industry is a dying industry, that nobody seems to be interested in preserving it, and so these toolmakers did not come back. There was not one of these toolmakers that had not worked for us for at least 10 years. There was not one of them that did not have at least 10 years' training period on their job. Well, that is 800 man-years of time that has been dissipated away from a very critical industry.

Beginning in last May, I have been down to Washington on many occasions to present this matter to those people in authority that are charged with the responsibility for our defense, to tell them exactly what the situation was. It has not been possible to get plans augmented or implemented to preserve the industry. I believe that it is one of the most fortunate things that has happened for our country, that this august body is looking into and examining the situation.

When we got our people back, even though they had been very skilled, we had to have a retraining period for all of them. And when you need watches, you do not have time for a retraining period. It just is not there.

On lesser skills, the same thing happened, and even to a greater degree, because these people were dispersed and had not always had the great experience of having worked at a job for 10 or 15 years. And then you do not want to work at anything else; and they were dispersed even more widely.

To tell you how critical the situation is, if we change our people from one side to another of a watch to work on, there is a retraining period. So if our industry is going to be allowed to be liquidated—and actually, that is a good word for it—if it is going to be allowed to be liquidated, we will never have a watch industry back again in this country in any of the lifetimes of the people that are here today.

We have always taken the position that other industries could make watches, if they had the time, and if they wanted to invest the money on what seems to be a hopeless venture for profit. When we completed that A–13 clock, and I brought it down here and showed it to the Defense Department, I challenged any other industry in the United States to make it, and went further to say that we would supply the machine tools that we had manufactured, the tools we had manufactured, everything to make the clock, and turn it over to any industry, no matter what it was, no matter how big they were or how important they were, and defy them to make a clock that would run. This

achievement is peculiar to the watch industry, so far as present ability is concerned.

You have been informed of what has happened in England as to their losing their industry. I would like to point out to you that during World War II we supplied to the Allies, the whole industry did, 162,396 timepieces, that we had to take out of supplies that we sorely needed ourselves. They had nowhere else to get them. They could not get them from any other watchmaker in the world, and they had no watch manufacturing of their own.

So the important thing is our skills that must be maintained.

The next important thing is our machine tools, which must be constantly improved to meet ever increasing demands.

During World War II, it is true that many other people contracted for precision instruments. I would like you to know that the Waltham Watch Co. during World War II supplied almost everybody who made precision instruments with some of their parts. We supplied Chicago Clock, Chrysler Motors, Consolidated Aircraft, Crosby, Douglas Aircraft. I am not going to take your time and read this lengthy list. This information is in the hands of the Defense Department. If your committee would like a copy of this, you are welcome to it, to see just how well other people would have gotten along if there had not been a watch industry. I think I have already given your committee a copy of this.

I just want to look at my notes here. I want to tell you, too, that the Waltham Watch Co. has been in business since 1850, and during every war which our company was in, they were suppliers of materiel. And I do not think that that could be accidental. I think it could only be because the watch industry has something to offer that no other industry has. I not only think so, but I know that that is so.

Senator DUFF. You figure that every segment of the watch industry, or not the watch industry alone but the horological science, is necessary for the national defense?

Mr. SACHS. Yes, sir, the entire horological industry is entirely necessary for defense. I think that was well borne out during World War II with the contribution that each of us made.

I have concluded my statement, if there are some questions.

Senator STENNIS. I do not think I have any questions, Mr. Chairman.

Mr. SACHS. Thank you.

Senator DUFF. Thank you, Mr. Sachs. Mr. James Shennan, president of the Elgin National Watch Co., will be the next witness.

(Biography of Mr. Shennan:)

JAMES E. SHENNAN, PRESIDENT, ELGIN NATIONAL WATCH CO., ELGIN, ILL.

James E. Shennan—born in Hazelton, Pa., 1910. Graduated from Princeton University in 1932 with an A. B. degree. Employed by the Elgin National Watch Co. in 1932. In 1938 became plant superintendent and made a complete study of Elgin National Watch Co.'s production capabilities in the event of war. In 1942 was made second vice president and was put in complete charge of the Elgin National Watch Co. fuse plant. After the war he made a study for the United States Government of the German clock and watch industry. In August 1945, he visited Eastern Europe as a member of the Technical Industrial Intelligence Committee. In 1946 he became vice president in charge of manufacturing and in 1947 was made executive vice president. In 1948 he became president of the Elgin National Watch Co. He is also a director of DuKane Corp., St. Charles, Ill., and the Northern Trust Co., Chicago, Ill.

TESTIMONY OF JAMES G. SHENNAN, PRESIDENT, ELGIN NATIONAL WATCH CO., ELGIN, ILL.

Mr. SHENNAN. Mr. Chairman, my name is James G. Shennan. I am president of the Elgin National Watch Co. of Elgin, Ill. We also have plants in Lincoln, Nebr., Dayton, Ky., and Providence, R. I.

I am a little at a disadvantage today, because my competitors have been doing such a fine job of selling their products. But I am speaking for the horological industry in respect to fuses, so I have to tone down some of the things I would like to say.

I have a prepared statement which I submitted to the subcommittee. With your permission, I shall expand on that statement briefly.

Senator DUFF. The statement will be entered in the record at this point. Please proceed.

(The statement follows:)

STATEMENT OF JAMES G. SHENNAN

Gentlemen, my name is James G. Shennan and I am president of the Elgin National Watch Co., Elgin, Ill. (with plants in Elgin, Ill.; Lincoln, Nebr.; Dayton, Ky.; and Providence, R. I.). While I am representing the American jeweled-watch industry, I will speak today about the importance and essentiality of the entire horological industry in respect to fuses. The industry has plants in the following states: Connecticut, North Dakota, Nebraska, Massachusetts, Illinois, Kentucky, Rhode Island, New York, Pennsylvania, and Texas. Because their work on fuses has been so interrelated, it has been quite difficult to separate out the contributions of either the nonjeweled watch and clock branch of the horological industry or the jeweled-watch branch of the horological industry.

The entire question of the importance of the industry to the production of fuses and timing mechanisms has been confused by assertions that anybody can make time fuses whether within or without the horological industry. Now we would like to make it perfectly clear that we agree that, given the equipment and the time to develop the know-how and train the necessary workers anyone can produce the known time fuses. However, the qualifications with respect to equipment and time needed by the other industries is so great as to make total reliance upon them as a source for fuses and similar timing mechanisms entirely impossible. There are, moreover, some timing mechanisms which contain jeweled-watch movements. No other industry could produce these in less than a period of years. Other fuses of the type which have been in mass production take less time.

The assertions that others can make these fuses have been, in general, in the form of unsupported opinion. The suggestion that this country should accept such opinions in preference to the history of fuse production and development in this country and in other countries, is a disservice to our national security. If other industries are an equally good source for such production, why is it that the horological industry in Germany was the backbone of the fuse program for the German war machine? Why was it that the Germans turned to the Swiss watch industry for production of these items and the machinery to produce them? Why was it that England, by the admission of Sir Stafford Cripps in 1945, suffered greatly from a gap in its industrial arsenal due to the absence of an adequate clock and watch industry? Why did the Russians take all of the watch and clockmaking facilities out of East Germany? Why is it that the horological industry in the United States was called upon to supply the great majority of fuses during World War II?

This was not happenstance. Wherever there was a horological industry it was immediately utilized because those responsible for procurement understood that its natural aptitudes best fitted it to supply the demands, and where there was no horological industry its lack was keenly felt. The question is not who, under no limitations of time, can produce fuses. The question in event of war is who can make fuses in quantities and to specifications required in the time limits imposed by our enemies.

To clarify the role of the horological industry in this field, it seems worth while to go back a bit in the history of the development and production of the mechanical time fuse so as to get at the facts.

As a result of the unsatisfactory performance of the powder train type of fuse used in World War I, Army Ordnance in 1929 decided to procure the drawings and technical know-how of a new antiaircraft timing fuse which had been developed in Germany. And it should be noted at the outset that this fuse originated in the German horological industry. The device was known as the Junghans fuse and had been developed by the Junghans Clock Co. of Schramberg, Germany. It was then being produced on an experimental basis in Switzerland for the British Government, again by the horological industry. Original tooling for this Junghans fuse, now commonly referred to as the mechanical time fuse, was purchased from the Junghans Co. in Germany by the Army Ordnance and shipped to this country about 1930. Army Ordnance, with help from the Navy, set up a complete Government facility at Frankford Arsenal to manufacture this new fuse.

Frankford Arsenal hired several German and Swiss horological engineers to run this fuse plant. Even with this expert assistance, it was not until 1938 that a sample lot of time fuses was produced. During this development period, the Asenal consulted with and called upon the American horological industry to assist them in overcoming their timing, testing and production problems. They came to the horological industry after having previously sought help without success from one of the largest electrical companies in the country.

It is perfectly true that during World War II many companies outside the horological industry held prime contracts for the production of this fuse. But without exception they obtained assistance from the horological industry. And, as I will show in a moment, the development work was done almost completely within the industry.

A company outside the industry was in fact the first company in production using the production drawings and techniques worked out at Frankford Arsenal on the basis of the Junghans methods, but only with the help of the horological engineers previously mentioned and some assistance from the horological industry in production of parts. But when the horological industry was brought into the picture, the fuse was substantially redesigned and improved.

Under the direction of Gen. Levin H. Campbell, Chief of Ordnance, United States Army, a joint fuse integrating committee was formed by the armed services. This committee was guided principally by members of the horological industry on the several hundred engineering changes which had to be made so that companies outside the industry could satisfactorily produce the fuse on a routine basis.

For example, when the Navy Bureau of Ordnance ran into serious rusting conditions of the fuse timing mechanisms in the fleet, the Navy came to one of the watch companies with a research and development contract to find means of overcoming the difficulty. This company quickly found a means of completely waterproofing the fuses so they would perform satisfactorily under severe conditions. This waterproofing greatly reduced the loss of ammunition in the fleet and eliminated duds caused by rust.

The Navy Bureau of Ordnance was furnishing time fuses to the Russians and ran into serious lubrication trouble because of the extreme Arctic conditions under which some of these fuses were used. At the request of the Navy, it was one of the watch companies who assisted the time-fuse committee in finding a suitable oil to meet these unusual low-temperature requirements.

It was found in the early stages of World War II that the original Junghans fuse would not stand up in worn guns, and again it was a watch company which redesigned and strengthened the timing mechanism.

The first combination point detonating and mechanical time fuse was designed and developed by a watch company.

This committee has on file a letter dated November 8, 1944, from Rear Adm. G. F. Hussey, Jr., Chief of the Bureau of Ordnance, in which he referred to the work of the member companies of the American Jeweled Watch Association on the mechanical time fuse. He said:

"In the field of the mechanical time fuse alone, there is no question but that more progress has been made since the introduction of the associated companies into the engineering and production picture than had been made in any corresponding previous period. There is definite ground for the belief, in fact, that the present highly satisfactory status of these fuses would not have been achieved without the technical skill of these companies."

In our present emergency, it was again an American watch company which developed an improved version of the mechanical time fuse for the Navy Bureau of Ordnance.

In the early part of World War II, the British came to the American horological industry for help in producing their version of the mechanical time fuse since their source in Switzerland had been cut off and they had no watch or clock industry left to turn to. Their fuse was quickly tooled up by a member of the American industry and satisfactorily produced in this country for several years.

Toward the close of the war, three men, all of them members of this industry, were cited by the Government for the outstanding contributions they had made to the mechanical time fuse program. So far as we can determine, they were the only men in the fuse program who were personally cited for outstanding work.

There was only one company outside of the horological industry, namely, the Eastman Kodak naval ordnance plant, that has been able to attain a high degree of independence. They have now had 12 years of experience in the fuse program. This company has a Government-owned plant managed by Eastman people for the Navy Bureau of Ordnance, which did a fine job in both production and development during World War II and Korean war. However, it has been constantly assisted by the horological industry, through technical assistance and the production of key parts.

There are other companies which because of experience gained in World War II, are now producing the mechanical time fuse, but I would like to repeat that the development work was done by the horological industry and that all of these other companies and Frankford Arsenal have relied upon the horological industry for technical assistance and for critical parts.

And a further fact, which should be of interest to this committee, is that even with the combined assistance of the American horological industry, it has been necessary since 1950 to purchase over 30 million parts from the Swiss horological industry to be used in production fuses in America. And this was only a limited emergency, not a full mobilization.

Since the Korean war, it was again to our industry that the Armed Forces have turned for the major part of the research and development work as well as production contracts on the many different timing mechanisms and fusing devices required for the antiaircraft program, the guided-missile program, the rocket program, and many others equally or more essential.

At the outbreak of the Korean war, the Navy Bureau of Ordnance urgently needed an arming and safety device to prevent premature explosion of a new air-to-ground antitank rocket, which was endangering the lives of our pilots. A member of our industry engineered and produced a completely satisfactory mechanism within a period of 28 days. The Navy came to our industry after contacting a great many others and because they found that no other industry was in a position to manufacture such a precise and accurate device in that short a time.

The Navy Bureau of Ordnance had the production responsibility of this important proximity fuse program. The critical component of this fuse was a rear-fitting timing and safety device. Immediately the Bureau turned to the members of this horological industry for their large production requirements, and it is a matter of record that several members of this jeweled-watch industry were in production within 7 months. Furthermore, since, at that time, their drawings and specifications were only tentative, it required all the technical knowledge and background of these companies to produce an acceptable rear fitting which would pass the rigid test requirements.

Since the trend in these mechanisms is toward more miniaturized versions, members of our industry have been called upon to design and produce a new tiny fuse for the rocket program. A satisfactory fuse has now been developed which will withstand all the rigid requirements called for by the Armed Forces.

Shortly thereafter a member of our industry, the Elgin National Watch Co., was called by Army Ordnance to attend a meeting in Washington to discuss a new and urgently needed timing device for a mine. Working from a rough sketch and with no definite specifications, this company developed and produced a pilot lot of this very complicated fusing device in 4 months from receipt of the contract.

During Korea, one of the jeweled watch companies was called upon by Eastman Kodak to product a very delicate torque control unit, which that company had made for Eastman in World War II. This unit had been copied from a German mine fuse and only the horological industry had the technical background and know-how to produce the very sensitive device.

In this general connection, again it was a member of this industry which recently developed, completely at their own expense, a low-temperature lubricant which will enable many of the various timing devices to perform satisfactorily at temperatures as low as minus 100° F. so as to eliminate many of the problems of fighting a war at subarctic temperatures and at high altitudes.

Basically, gentlemen, it seems to me that the record of what has actually happened is of more importance than the opinions of either our industry or of other industries as to whether or not the horological industry is important in the fuse programs. The fact is that at the end of 1953 slightly over 80 percent of the total production contracts for such important items as the timing mechanisms of the proximity fuse, the timing mechanisms of the rocket fuse, and the mechanical time fuse, were being produced by the horological industry. If the industry is not essential, how does it happen that it was doing 80 percent of this work?

In addition, of the approximately 36 million fusing devices and timing mechanisms manufactured last year, members of the horological industry manufactured approximately 95 percent of certain critical parts. Gentlemen, the record of what the horological industry actually has done in fuse programs since the original Junghans design was purchased in 1929 speaks for itself.

Finally, it must be remembered that the essence of the essentiality of the horological industry to national defense lies in its ability to design and engineer extremely precise timing mechanisms, build the tools, produce the parts, and deliver quickly and in great and continuing volume. This ability is native to the clock and watch industry because of its day-to-day work in the field of civilian timing devices. It possesses the specially designed equipment and the unique skills of technicians who, by continuous application over a long period of time, have mastered the know-how of low-cost precision mass production.

It is, and always has been, to us who know this industry and the nature of its work, a strange thing indeed that its importance to the mobilization base of this Nation should be a question at this late date. The history of World War II, and even the experience of the British, alone, should have taught us long ago a lesson that no one would ever forget. The facts are clear and simple, and any attempt to explain them away must be based on nonmilitary motives. Those who are concerned with the military preparedness of this country, as is this committee, must see that the lesson is relearned and that the irreplaceable skills are not lost.

Mr. SHENNAN. Before I start talking about fuses, I would like to say a word, sir, about my qualifications to speak on the subject.

During the Second World War, I was responsible for the contracting and production of Elgin's fuse operations. Since that time, I was fortunate enough to progress to the presidency of our company.

We have been very deeply involved in the fuse problem in this Korean war, and still are. In fact, we are at the highest level we have ever been right now so far as making fuses is concerned, roughly three times as high a level as we reached during the Second World War.

I am speaking for the entire horological industry, because with respect to fuses, the industry is interdependent. We all exchange parts back and forth. We all make various kinds of fuses.

I might say that this industry, the horological industry, has plants in the following States: Connecticut, North Dakota, Nebraska, Massachusetts, Illinois, Kentucky, Rhode Island, New York, Pennsylvania, and Texas. It is a pretty well spread out industry.

I have here some of these fuses. Some of this is classified material, sir. We are authorized to show it to the Senators on the committee, but not to show it around the room.

I can describe to some extent what these are. That is a fuse that is used in rockets. It is an arming device. The fuse is perfectly safe until the rocket has been fired and gets away from the plane or the ground installation. The rockets are getting smaller and pack more of a wallop. It is very hard, when you look at a fuse, sir, to realize what is inside of it.

Here is a new development that has a secret classification, that is to replace the mechanism in that fuse so that they can make the rockets smaller in diameter and pack more of them in a plane. They expect that that will just about double the payload of explosives in a fighter or pursuit plane. I think if you look at that thing you will see there

is a lot of work involved in making those things by the millions, because that is what the requirement will be. It is perfectly safe, sir. It is not loaded. You can't tell much from the outside. It is a very complicated device. You have heard mention of a rear fitting today, used in the VT program. You cannot see much from the outside, but the inside is packed with gears and levers and springs and pinions and all kinds and descriptions of things. It is a highly complex job, which must be made in terms of many thousands a day.

Senator STENNIS. This item here replaces the interior of this one?

Mr. SHEENAN. For the smaller rockets. Because that is so big that actually the size of the mechanism limits the diameter of the rocket. They have got to have a big enough rocket to take the head.

Now, these developments I am referring to are not exclusive to the jeweled-watch industry or to Elgin. This is an industry project, and they are all in various aspects of this.

There is a gadget that is a mine device. There are two watch movements in that one, and the unique thing about that is that one is a nonjeweled watch movement and the other is a jeweled watch movement. There is the case of the industry, you might say, collaborating.

I think I am a little circumscribed on being able to explain what that is, but it is a horrendous device for a land mine that theoretically will make it impossible for the enemy to go through and wipe out a minefield. I don't even like to think about that one.

I am not going to read my statement, sir. I am going to just hit the high spots in it.

There have been a lot of irresponsible statements made that anybody can make these fuses. I don't think that is so, and I think we can demonstrate that it is not so. These statements have been unsupported; they have been purely opinion. In our opinion, it is a disservice to our national security for irresponsible elements to make these statements. If other industries are a perfectly good source for these fuses, then why is it that throughout the world it is the horological industry that governments come to, that the military people come to, to develop these and make them, which is true.

In Germany it was true; in England it is true. That has been said before.

The question really is not who can make these fuses, but it is who, with the limitations of time, can do these things on time. Who can do the development work? It is perfectly true that other people given time and given help and assistance can assemble these fuses and make some of the parts, but history all over the world indicates that it is the horological industry that does the development work, that does the design, that does the tooling, that spreads its know-how around.

Senator DUFF. As a matter of fact, so far it is the one industry that has done so, is it not?

Mr. SHENNAN. Yes, sir.

Senator DUFF. You have had no competition in this sort of thing, have you?

Mr. SHENNAN. Yes, sir; as I said, there are other companies who, with the assistance of the horological industry on certain critical parts, with the proper know-how, can do it.

Senator DUFF. Are there any others who entirely on their own can make these devices?

Mr. SHENNAN. The only company anywhere I know of is the Eastman Kodak Co., who make highly complicated camera mechanisms. At the end of the last war, they agreed to manage a Naval Ordnance plant in Rochester.

Senator DUFF. From your observation and experience, is that the one outfit outside of the horological group that is able to make precision instruments exclusively on their own?

Mr. SHENNAN. I do not know that they can do it exclusively on their own, but they are more capable than anyone else, Senator Duff. They have gotten help from the horological industry consistently, both in parts and in technical know-how, engineering problems, and so forth. But we certainly would not deprecate them. They are very capable people, as we all know.

But I know of no one else, sir.

Senator DUFF. I think the committee is anxious to know whether there are any other sources of skill or ability that could step into this picture in a crisis.

Mr. SHENNAN. If you add the qualification of time, I would say "No." I think it is true that other industries, given sufficient time, can do it.

Senator DUFF. Yes. I understand. But within a sufficient period of time to be usable in a crisis.

Mr. SHENNAN. No, sir. I would say absolutely no.

Shall I go on, sir?

Senator DUFF. Yes, sir, please.

Mr. SHENNAN. I think one thing that is of interest is the question of development of these fuses. While they have been made in some other companies outside of the industry, so far as I know all of the development work has been in the horological industry plus some work at Eastman Kodak. I can give you just a few examples, which might be interesting. During the last war, it was found that antiaircraft fuses, such as this type, not this exact fuse, were rusting, because they were exposed to salt air, and they would rust, and the fuse would work or wouldn't work, and if fired it would be a dud. You only get 70 shots in a plane coming in, and you can't afford to have any that don't go off. We very quickly found a way to rustproof the fuse and not impair its function.

We were furnishing fuses to the Russians during the last war, of this type.

Senator DUFF. They are probably still using them, too.

Mr. SHENNAN. That might be, sir. And in using them up in the North Atlantic on the Murmansk run, they ran into troubles because of the Arctic conditions, under which the lubrication failed them.

We solved that problem. We found this fuse, which, incidentally, was of German design, which our Government bought from the German people in 1929, wouldn't stand up in badly worn guns. The cost of replacing the insides of the guns was a problem. One of our members redesigned the fuse so that it could go out and rattle all the way down and still not be shaken to pieces.

There are lots of others that I won't take your time on.

The British industry, as has been mentioned today, had no fuses when they got into this war.

They came over here to members of horological industry, who tooled them up and put them in production, and we supplied the British

with their antiaircraft fuses. They had been getting them from Switzerland prior to that time.

An interesting fact, I think, is that during this Korean emergency and immediately thereafter, because of lack of capacity in the horological industry in this country—talking now about it disappearing and getting smaller, such as we are able to do—we were unable to supply the parts and fuses for this war. We purchased over 30 million parts from the Swiss industry to make fuses for our own Government for this Korean war, and we think that is a very, very dangerous situation to be in.

During the Korean war there was a great deal more development. This little rocket fuse that I showed you, sir, the first one—the Navy brought that to our plant, it so happened, as I remember very well, in July 1950. The Long Tom rockets were going off prematurely in Korea. They were actually blowing up planes. They said, "We must get some of these things immediately."

Senator DUFF. One of the points that you are emphasizing, as I understand from your testimony, is that in the event we are going to need them in another war, we are going to need them awfully fast.

Mr. SHENNAN. Absolutely. In this case we made the first batch of those fuses in 28 days.

Senator STENNIS. That was July 1950.

Mr. SHENNAN. July 1950.

Senator STENNIS. The shooting started June 25.

Mr. SHENNAN. It was just a few weeks after the shooting started. These were big antitank rockets, 7-inch rockets. You can imagine if they went off on a plane that there wasn't any plane left. There wasn't time to train a lot of people. We turned the whole place over and made those fuses.

One of these fitting devices I mentioned was put into production in 7 months. I don't know how you could do it if you didn't have people there you could just grab off their work and put over there.

I mentioned this very tiny fuse for the rocket program. A satisfactory fuse has now been developed which will withstand all the rigid requirements called for by the Armed Forces.

There is a low temperature lubricant, for example, that this industry has developed. One of the great problems in Arctic operations, both in fuses and time pieces and instruments, is that when it gets down to 60° below zero all the instruments stop. At our own expense we developed a lubricant that will go now to 100° below zero, which is going to loosen up that problem, which has been a major problem right along.

Basically, gentlemen, it seems to me that the record of what has happened is more important than the opinions of other people as to what the importance of this industry is in the fuse business.

The fact is that at the end of 1953 slightly over 80 percent of the total production contracts for such important items as the timing mechanisms of the proximity fuse, the timing mechanisms of rocket fuses, the mechanical time fuse, were being produced by the horological industry. If this industry is not essential, how does it happen that it is doing 80 percent of the work?

In addition to that, of the approximately 36 million fusing devices and timing mechanisms manufactured last year, members of this industry manufactured approximately 95 percent of certain of the

critical parts, the things where the great skill comes in. So I think that what the industry has done speaks for itself.

Now, one other thing I would like to touch on, that was very difficult for us to understand. It is and has been, to those of us who know this industry and the nature of its work, a very strange thing that its importance to the mobilization base of this Nation should be a question at this late date.

The history of World War II, and even the experience of the British, alone, should have taught us long ago a lesson that on one would ever forget. The facts are clear and simple, and any attempt to explain them away must be based on some other motive than a military motive.

One thing that has not been spoken of here today, a condition that it seems to me underlies this whole inquiry: After I listened to the Government representatives speak this morning, from what I know of the industry it is very hard for me to understand why this question should even have to be brought up to use the time of you gentlemen, to go into the question of whether or not the horological industry is essential.

Well, there is a reason for it, that I would like to mention. There are people at the lower levels in our Government and in the Defense Department who are assiduously working to undermine this position. We know that is so. A very good example was given this morning when Mr. Buschman was called upon to answer a question of one of you gentlemen. He was asked whether the Defense Department could get certain special timing devices other than fuses from any other than the horological industry.

And you remember, gentlemen, he answered, "No, but." I had a little difficulty understanding the answer, but I think that what he was saying was that other industries could do it if they had a chance to do the development work, and the reason they were not doing it was because the watch industry was doing the development work.

Well, there is a very good reason why the watch and horological industries were doing the development work. Because we are the ones that can do it. We were repeatedly approached by the military people on ideas they have, fuse work and other such things. When it is in our line, as these things are, they have to come to us, because there isn't anyone else to do it in the time they have to do it.

This gentleman stood up and attempted to disparage, in my opinion, the work that the industry is doing.

It seems to me that it might be proper—and in this statement I am not specifically referring to Mr. Buschman; I brought him in because he answered a question this morning, which I thought begged the question.

Senator DUFF. "Yes, but" is the same as "No, but." It does not answer anything.

Mr. SHENNAN. Frankly, we have wondered what it is that motivates this work that is done at the lower levels in the Defense Department, for one, when we have heard expressions here of their top men today and at other times that seem to go counter to the policy of those people. And it makes a lot of difference, gentlemen, because they work and work and water down and change everything.

And we as citizens cannot understand how these things can go on. And I just did not feel that I could come here and speak to you without pointing that out.

Gentlemen, that is my statement. I would be very happy to answer any questions that any of you may have.

Senator DUFF. Senator Cooper?

Senator COOPER. I am sorry I missed the first part of your statement. What you said at the last raises a question which has addressed itself to me. I want to say that I think you have made a very good case in the statements that have been made here in support of this position that you have taken. But why does not the Defense Department say that this is essential to the defense of the United States?

Why ask this question here?

Mr. SHENNAN. If I may say so, sir, I think that your committee could more easily get an answer from the Defense Department on that than we could.

Senator COOPER. You have just suggested some reasons that you think are important. Can you elaborate on that?

Mr. SHENNAN. Well, sir, I don't know what the reasons are. It is completely baffling to me. I am obviously a prejudiced person, because I have been in this so long and had the pressure on me from the military people. I am prejudiced, I admit. But when Mr. Pike and Mr. Flemming were here, making what I thought were pretty straightforward statements of their feelings—I don't want to say this about the ODM, because I don't know, but I know in the Defense Department there are people who are assiduously trying to scuttle this industry.

I don't know. They may have an honest intellectual belief in free trade to the extent that they feel it overrides other issues. That may be it. But I don't know what the motivation is.

Senator COOPER. Suppose that some of these industries go out of business because they are not able to compete with the Swiss watch industry. I think that is the reason this thing is here to begin with. Would these workers, these skilled people, still be available for defense work?

Mr. SHENNAN. I don't think so, sir, and I will explain why. First of all, the companies will not go out of business. We can all import watches. We are importing watches. We are making a profit on our importing operations, although we are losing money on our domestic watch movement manufacturing. If we have to go out of the watch movement manufacturing, we will simply shift over to importing. We are not going to go out of business.

Now, it has been my experience, and I have been in the production end of the watch business since 1942, that when you take people off a skilled operation, when they leave us or leave a skilled operation in some way, they very quickly lose their skills. They must go through retraining when they come back. This work is nervous. It is small. They frequently do not want to come back when there is an opportunity.

Certainly on the jewel bearing business, we had a nightmare keeping people on that work. They just did not want to do it.

Senator DUFF. I believe in Senator Cooper's absence Mr. Sinkler of the Hamilton Watch Co. testified he had been a part of the skilled operation before he became interested in the business end of it, and at the end of 3 years he felt that he had very largely lost the skill that he had had, and it would take him a considerable time to get it back.

Mr. SHENNAN. I might say I had exactly the same experience, because I also started out as a watchmaker, and it was not long before I was behind the procession on fixing anything. I got away from that and got into supervision.

Senator COOPER. Is it then the premise that this type of work requires so much skill that they must be continually at work on this more difficult type of work to be able to handle these intricate defense devices?

Mr. SHENNAN. That is my belief, sir. I don't know how you can keep your hand in without working at it. There are the engineering skills, too, that a man develops continuously. He never stops developing his engineering skills so long as he is at work, but if his work stops his development stops.

Senator DUFF. It is something like a prizefighter who is out of the ring for a few years.

Mr. SHENNAN. Senator Cooper, I am sorry you were not here. I mentioned that we had a plant in Kentucky.

Senator STENNIS. Well, I do not think this gentleman should be too disturbed because of a little difference in the testimony. What disturbs us here sometimes is too much uniformity in some of the testimony from different departments.

I am very much impressed with what you say here. You agree with these other gentlemen that we could not get the supplies of these fine instruments and materials from the workmen of other companies in case of emergency. I do not know just what the issue is, here, though, just what it is you are wanting. I have not been briefed on that.

This ultimately becomes a question of tariff. Is that correct? That is what it is headed for?

Mr. SHENNAN. That is what we are in right now. It is a question of doing something to preserve the industry, but at the moment the tariff question is on President Eisenhower's desk.

Senator DUFF. In other words, in the assignment of this committee, we had a new assignment with respect to the tariff question. The purpose of our determination is to report on whether or not, irrespective of tariff considerations, we believe that the industry is essential to the national defense.

Senator STENNIS. That is all. Thank you.

Senator COOPER. There would not be any question, though, before us, if there were not also a tariff question.

Mr. SHENNAN. I think as you say, unanimity of opinion is pretty suspicious, but the strength of contrary opinion has been such that this meeting was necessary to nail it down and get the people on record.

Senator STENNIS. You are making such a strong case that we may recommend that the Government just take you over and nationalize your industry. What would you think about that?

Mr. SHENNAN. We would be very unhappy about that.

Senator STENNIS. Before you leave, I want to say that someone gave me a 17-jewel Elgin watch when I was about 15 years old, and I kept that watch until after I came here to Washington, and someone stole it out of my residence or I would have it yet.

Mr. SHENNAN. I think our industry makes good products all the way around.

Senator STENNIS. Very fine products.

Senator DUFF. Thank you, Mr. Shennan. Walter Cenerazzo, president of the American Watch Workers Union, is our next witness.

TESTIMONY OF WALTER W. CENERAZZO, NATIONAL PRESIDENT, AMERICAN WATCH WORKERS UNION

Mr. CENERAZZO. Mr. Chairman, my name is Walter W. Cenerazzo.

Senator DUFF. Would you like to file your statement?

Mr. CENERAZZO. I would like to file the statement with the committee and just talk off the cuff, if I might.

Senator DUFF. That will be good. Without objection, the statement of Mr. Cenerazzo will be filed for the record at this point, and he will make extemporaneous suggestions as to what he has to say otherwise.

(The statement follows:)

STATEMENT OF WALTER W. CENERAZZO

The American Watch Workers Union, founded in 1943, is a national union—independent of any other national affiliation—is composed of employees of the American jeweled watch industry.

The American Watch Workers Union is the certified collective bargaining agency for the employees employed on production and maintenance of the following companies:

Lincoln Division, Elgin National Watch Co., Lincoln, Nebr.
Elgin Division, Elgin National Watch Co., Elgin, Ill.
Hamilton Watch Co., Lancaster, Pa.
Waltham Watch Co., Waltham, Mass.

Walter W. Cenerazzo, the author of this statement, is a printer by trade, former organizer of the American Federation of Labor, founder and national president of the American Watch Workers Union.

The American Watch Workers and its officers have been waging an intense campaign since the union was founded in 1943 against what we consider an unjust position of the United States Government toward an industry which is indispensable in time of war to the United States Government.

This unjust position is one which permits the Swiss watch importers to have entrenched themselves in the United States market to where they now enjoy better than 80 percent of the American market, due to low tariff and the exclusion of the American jeweled watch industry from the American market during World War II.

What is before your subcommittee is whether or not the American jeweled watch industry is essential to national defense and for that purpose, I would like to relate for the consideration of your committee the facts at my command.

There are three principal areas in which the industry is essential to national defense and I will mention these briefly.

JEWEL BEARINGS

After Pearl Harbor day, the manufacturers of precision instruments in the United States found themselves in desperate need of jewel bearings. Switzerland, the only major source of supply, was surrounded by the German Army, and the harbor was closed. It became necessary for the War Production Board to freeze all jewel bearings in the hands of American jeweled watch manufacturers and to cull out jewel bearings of forty one-thousandths and over so that the manufacturer of precision instruments necessary for warfare could continue.

The services had underestimated the jewel bearing problem in 1940 and 1941 and were faced with a crisis in both instrument and watch jewels. Fortunately three of the watch companies—Bulova, Elgin, and Hamilton—had foreseen the impending shortage and had set up production lines on their own responsibility and at their own expense.

When the seriousness of the situation finally dawned on the Government, it tried to expand production of jewel bearings in all the ways it could find. The records of the WPB will show that if it had not been for the work of the watch companies this would have been another case of too little and too late.

It is important for the committee to know, however, that although the watch companies solved shortages of both instrument and watch jewels, they could not have done it unless we had been able to secure some jewel bearings from Switzerland by smuggling.

It is not safe to believe that, if we have another war, we will be able to smuggle jewel bearings out of Switzerland. We will have to rely on our own production. And we will have to have the watch companies but we will need bigger companies with more facilities.

I would like for this committee to consider whether jewel bearings should be regarded as a problem and where the answer lies if the watch companies are not to be preserved. If these companies go out of production the Government will be giving away its natural source for jewel bearings and will have to set up its own facilities. Even if the Government tries to set up its own plants, it would still have to find somebody to run them and the only source for skilled workers and equipment is the watch industry, and they will be right back where they started.

Without this reserve supply of the American jeweled watch manufacturers, our defense would have been in a bad way. The armed services let out contracts to Elgin, Hamilton, and the Bird Jewel Co. for the manufacture of jeweled watch bearings. The cost of these jewels at the beginning of production was $1 or more each. After about a year experimentation and getting under way of production, the cost was reduced to 21 cents. It is interesting to know that once the Swiss were able to export again with V–E Day happening, all contracts for the manufacture of jewel bearings in the United States were canceled and all of the know-how and trained workers were dispersed.

Did this show good judgment on the part of those in charge of planning in the Defense Department?

During World War II, the Elgin, Hamilton, and Waltham Watch Cos. in their entirety produced for the armed services of the United States and its Allies—what did they produce? Hack watches—that is a 21-jewel watch—6/0 size with sweep second hand which was issued to all those in the Air Force and most persons in the Armed Forces. This watch was the synchronization watch for accurate timing during time of attack. Airplane clocks which had to be tooled for and put into production and so that we may be accurate.

TIMEPIECES

During World War II the jeweled watch companies produced a great many different kinds of timepieces badly needed by the Army, Navy, and Air Force, including deck watches, chronometer watches, navigation watches, hack wrist watches, elapsed time clocks, marine clocks, aircraft clocks, tank clocks, and the marine chronometer.

The marine-chronometer production is an illustration of just how important the industry can be and how shortsighted our services can be. The Navy had said before the war that we would not need marine chronometers, or, if we did, only a few. Finally it was understood that we needed them and as it turned out we needed thousands.

Hamilton Watch Co. started from scratch and produced chronometers for the Navy. The only other source of supply in the world was Switzerland and this source was not available. The records of the War Production Board and the exports from Switzerland during the years 1941–44 are available to your subcommittee and you will have accurate information as to the true status of this subject by obtaining these records. Hamilton had to develop the plans, do the research work, engineer the machinery and equipment necessary to produce and had to set up a brand new department for the production of these chronometers. Without the reservoir of skilled help in its watch factory to draw from, it never would have been able to set up and produce these chronometers.

The Elgin Watch Co. at a later date was given a contract to produce chronometers. With the blueprints and know-how of Hamilton and the skilled force of watchworkers at its command it never was able to produce on a production basis chronometers to supply the armed services—it did not have time to organize its production facilities for this job before V–E and V–J day happened, proving that if Elgin with its know-how and organization and skilled watch force could not produce in a short period of time and yes, even in a 2-year period, how can any adding machine or cash register company produce them in the time essential to win a war or produce them under any circumstances.

May I suggest to this subcommittee that a list of the timepieces produced by these three companies be obtained from either them or the armed services so that you will have the accurate information in your hands. You will find that what these three companies produce in the timing mechanism field cannot be produced in the United States by any other manufacturer and there were products produced by even this industry that were time-consuming in order to prepare for production, and that our armed services were delayed in obtaining this production because the research and engineering and tooling had to be developed before it could be put into production. No other industry could produce it and the jeweled-watch industry did produce it.

FUSES AND OTHER TIMING MECHANISMS

There has been a lot said about how other companies than the watch companies can make fuses. It is claimed that companies who make cash registers, business machines, and typewriters can make all the fuses needed in war. This is nonsense. The country is entirely dependent on the jeweled and nonjeweled watch and clock industry for fuses and the records of World War II and Korea will show that. The great majority of the parts going into all our fuses come out of the horological industry, working as a team. Other people made some parts, yes, but they borrowed the know-how of the watch and clock industry and would have been helpless to supply the volume that was needed without that industry. And the important development work on fuses has nearly all come out of these watch and clock companies.

The fact is, gentlemen, that the skills of the watch companies are such that they furnish the best source for this work—saving valuable time and many lives. Fuses are developing and changing much more rapidly than they did in World War II when we used chiefly the old mechanical time fuse. And we need the watch companies to keep on leading the way in this development as they have done in the past and are doing now. We must preserve the skills and the organizations necessary for national security. I would like to discuss these skills from my own experience, if I may.

THE WATCH INDUSTRY SKILLS

Each year during hearings before the Ways and Means Committee and Senate Finance Committee, as well as before the Tariff Commission hearings, the Swiss watch importers have deprecated the importance of the skills in a jeweled-watch factory. Mr. Benjamin Kafz, when he was president of the Gruen Watch Co. and head of the Swiss Watch Importers Association, made the claim that he would have an integrated jewel watch factory at Cincinnati in no time at all. Years have passed since the claim was made and the Commission by walking into the Gruen plant in Cincinnati will find that there are no facilities and skills to produce a jeweled-watch movement in its entirety, nor anywhere near enough facilities to produce even a good part of a watch movement.

The Bulova Watch Co. has been building a jeweled-watch plant in the United States for over 25 years. Its president, Arde Bulova, is a man of ingenuity, a competent production man as well as a competent businessman. He has had 25 years to develop it—he has had access to Swiss know-how by owning plants in Switzerland. He has had access to the Swiss labor force and has imported some of them through the years to the United States. If it took this ingenious man 25 years to develop this plant, with all available resources, how can it be said that the skills and facilities are not different from other industries? I have never been in the Bulova plant—all I can go by is hearsay—you are in a better position to get accurate information than I am. But of one thing I am sure—it took Bulova 25 years to obtain what he has and no other Swiss watch importer can accomplish what he has accomplished in establishing a jeweled-watch plant in the United States.

What are the skills in a jeweled-watch plant? There are over 30,000 piece rates at the Hamilton watch plant—there are over 700 classifications of work, some of them are simple jobs to learn, some are complex, all are repetitive and require a certain type of human being who can do day in and day out these repetitive tasks. The turnover in the first 6 months of employment in a watch factory runs very high and the actual statistics are available to your subcommittee by reviewing the employment statistics of the Elgin, Hamilton, and Waltham Watch Cos.

Once an employee has gone by the 6-month period, the chances of him or her staying for a long period of time are assured. The learning periods in a

watch factory run from 4 to 6 weeks on simple jobs, to a 10-year apprenticeship for a competent tool and diemaker.

The setup man in the watch manufacturing departments has a learning period of 18 months to 2 years, yet if one checked the actual experience of these men, it would take in excess of 5 years for a man to have the know-how and competent experience for him to coordinate those persons whose production he works with. Without competent setup men, it is impossible to run a watch-manufacturing department. At Waltham, these setup men are called job masters, at Hamilton they are called job bosses. A checkup on the know-how of these men will find that once these skills are lost, they can never again be replaced without many many years of training, even if a company had the job description and job duties of each of these jobs carefully filed away.

The spring truer is a classification which has a long learning period and which has sent more men to the hospital with a nervous breakdown than any other occupation I can think of—it is a nerve-wracking job that requires tremendous judgment and accuracy and there is not one person out of a thousand who can make the grade as a spring truer.

The assembly line classifications which are composed of persons who assemble a watch movement all require skill and coordination and the use of interchangeable parts. These persons work under high tension, must have human bodies whose systems will not rust the part they handle. Many persons automatically are eliminated from working on the assembly because the normal perspiration which their hands have rusts the parts they handle. This is also true on most of the jobs in the watch manufacturing departments.

The machine-shop classifications such as first-class machinist, machine builder, tool and diemaker, are all classifications where any one of the men can go to work in any other industry and make the grade, and yet I am willing to make a flat statement, that there is not 1 man in 500 who has been trained in other industries that can come into the jeweled-watch industry and pick up work and perform it in a jeweled-watch factory without several years' additional training in these classifications. Your subcommittee can obtain accurate information concerning this by checking the persons who have been hired by Elgin, Hamilton, and Waltham in their machine shops and finding out how many of them have quit because they either could not or would not do the work. These records are available to your subcommittee by an inspection of the employment records of the jeweled-watch companies. Once these employees are dispersed into other industries, it would be an impossibility to ever regather them to produce for a jeweled-watch company.

DISSIPATION OF SKILLS

With the industry losing its volume and with the technological improvements which have come into the industry, less and less employees are needed in the industry. Today we have less than 3,000 persons employed by Elgin, Hamilton, and Waltham on the manufacture and assembly of jeweled-watch movements as compared to over 8,000 in 1941.

Waltham Watch Co. has less than 100 persons employed on the manufacture and assembly of jeweled-watch movements. Its work force has been scattered to the four winds. It will take a long time to get the company back into production, even if it could get back all the employees it has been forced to let go, and how many persons would leave security of their new jobs to come back to an industry which has had the precariousness of the jeweled-watch industry.

The Elgin National Watch Co. has laid off every single person in its assembly department in its Elgin plant who has been trained in the last 15 years. The Elgin National Watch Co. has reduced its production to 900,000 units a year and is unable to give assurances that its production level will not drop even further.

The Hamilton Watch Co. has less than 1,200 persons employed on jeweled watch movements and is constantly reducing its work force and its work schedules. It has had 1 week off, 1 week shutdown in its watch departments in May and another in June. Elgin similarly has had a week's shutdown of its watch manufacturing facilities at its Elgin plant in the months of April, May, and June. The work force of each of these companies is extremely insecure as to what is going to happen in the future and it will mean that if employment opportunities present themselves elsewhere, they will accept them.

Trainees in these skilled classifications are practically extinct. There is no point of training persons for the future if you can't keep employed as journeymen those now on the job.

PRESSURE FOR PRODUCTION DURING WORLD WAR II

During World War II, the armed services wanted more and more production and sent expediters out into the field to push for more and more production. An instance of what happened at Waltham is the best example how badly the armed services needed more and more production that was not available any place else in the world, nor by any other manufacturer in the United States.

The commissioner of labor of Massachusetts called a meeting in his office in 1942 to discuss with the management of Waltham Watch, representatives of the Army, the Navy, and the Marine Corps and the union the problem of working a 50-hour week in violation of Massachusetts law and Federal law. The armed services stressed the need for more and more production and the commissioner of labor, after being informed by the management that you could not work part of the factory 50 hours and not work all of the factory without getting unbalanced production, agreed to let minors work 50 hours a week and he agreed to intercede with Secretary of Labor, as did the armed services, to obtain a waiver of the Walsh-Healey Act so that the women and minors could work 50 hours a week to get out more hack watches.

Permission was granted and for a long period of time Waltham employees worked 50 hours a week. Some 2 years later, the investigators of the Labor Department under Walsh-Healey inspected the payroll records of Waltham Watch and found that these women and minors had worked 50 hours. They claimed a violation of the law, V–E Day had happened and gone by, the armed services had failed to furnish Waltham Watch a written copy of the permission of the Secretary of Labor waiving the restrictions of Walsh-Healey, the armed services were no longer interested in the problem, they had their production and the eventuality was that the management had to pay a fine of $33,000 for having performed a service to the Nation in supplying such needed production at the request of the armed services of the United States. I was present at the meeting, I heard the conversations, I knew the management was right—that it had received a waiver verbally—it failed to obtain it in writing and are armed services showed their typical disregard for a job well done by an industry that it needs in wartime by failing to come forward and tell the truth.

THE DEFENSE DEPARTMENT ATTITUDE

On March 1, 1954, as national president of the Watch Workers Union, I was invited to the old State Department Building in Washington, D. C., to attend a meeting of the Office of Defense Mobilization to discuss the essential skills of the watch industry. At that meeting were representatives of the Labor, State, Commerce, Treasury, Defense, and Office of Defense Mobilization. I was permitted to give my views on the essentiality of the industry and as to the operation of a jeweled watch factory as it pertained to the necessary skills and work force. After my discourse, I was subject to questioning. It is interesting to know that the representatives of the Navy and the Defense Department did not deem it essential to cross-examine me on the skills of the industry but were more interested in the effect a raise in tariff would have on the watches retailing from $15 to $20. I took issue with Mr. Nye of the Defense Department and with the commander who represented the Navy, as I felt that their place at their meeting should have been to inquire as to the essentiality of the skills in the industry and whether they could be replaced.

Following this meeting, I called on Dr. Hilliard, of the Office of Defense Mobilization, and told him that I did not believe that the Defense Department representatives, Mr. Buschman and Mr. Nye, were impartial or objective and that I would appreciate it if he would call a new meeting to discuss the issue further. Dr. Hilliard discussed the subject at great length with me but felt that nothing would be gained by such further conference.

Following that conference I went to see Mr. Charles Thomas, then Assistant Secretary of Defense, with whom I conferred for approximately a half hour and expressed my alarm at the failure of the Defense Department to properly appraise the situation. He felt that the Department would be objective and considered that the matter was a classified one which could not be discussed with me but said that he himself would check the report to see that it was a fair one. I noted a firm resistance in my conversation with him to any criticism of Mr. Nye and Mr. Buschman.

At a later date, I arranged a meeting with Secretary of Defense Charles Wilson and at that meeting Mr. Thomas was present and after an hour and 25 minutes of discussion concerning the entire jeweled watch industry and the question of

tariff, I left feeling that I had Mr. Wilson's word that he personally would check the report and see that a square deal was given on the facts.

At a later date, from sources that I consider reliable, it came to my attention that the report did not conform (1) to the earlier stand taken by the Munitions Board in 1950 that the industry was essential to national defense, (2) the report of the National Security Resources Board which declared the industry was essential to national defense, (3) the stand taken by Gen. Douglas MacArthur as Chief of Staff in a letter to Secretary Dern in 1936 when he declared the industry was essential to national defense.

I was greatly alarmed by this rumor and called Secretary Thomas and he confirmed to me that there was ground for my information but would not discuss the report as it was classified.

I am completely satisfied that the Defense Department is again following its prior inadequate estimate of requirements which it made prior to World War II, and that the problem of timing mechanisms essential to modern warfare has not been properly estimated by the men who made the survey.

No one can justify to me at least, why, if the American jeweled watch industry is not essential to national defense that it was necessary for the Royal Air Force of England to bomb the community of Pforzheim, Germany, and kill 22,000 people in 23 minutes, in order to destroy the time and clock industry of Germany. I am sure that the only purpose of this destruction was to make impotent the enemy.

Why has England put an embargo on watch imports and plowed millions of dollars into the establishment and development of watch and clock industry in England?

Why did Russia come to the Hamilton Watch plant in 1946 and want to go through the plant with a corps of engineers to obtain the know-how concerning jeweled watches? These men were refused entrance to the plant by Calvin Kendig, president of the Hamilton Watch at that time.

Why did Russia buy the facilities of the Dueber-Hampden plant in Canton, Ohio, in 1926 when that plant failed? Why is it that Russia has scooped up from the German zones in its possession all of the watch machinery it could take after the defeat of Germany?

Why does Switzerland restrict the export of watch machinery if they did not believe they should jealously preserve their industry?

These questions are all questions which your subcommittee must take into consideration and which the Defense Department must competently answer and when they do, there is only one answer—the American jeweled watch industry is essential to national defense.

The American jeweled watch industry is essential to national defense because the skills of its employees are indispensable.

The American jeweled watch industry is essential to national defense because its employees are—

1. Indispensable to the production of jeweled watches.
2. Indispensable to the manufacture of jeweled bearings.
3. The very best skills essential for fuse production and in order to obtain production in a hurry, these skills are necessary in order to save time and therefore save lives.
4. Extremely important in fuse-development work.
5. And should be preserved as a reservoir of highest skills against unforeseen developments even if they are not known to be needed already today.

Fuse work in many of the companies which are not jeweled watch companies could not have been performed if they were not able to steal or hire away the skilled men, engineers, and workers, from the America jeweled watch industry in the first place. The know-how of the watch industry has been turned over to these companies over a long period of time and without it they could not have functioned and even with this know-how that they have obtained from the jeweled watch industry, they do not have the reservoir of skilled labor to do the job in a hurry without calling on the jeweled watch industry.

In closing my statement, I desire to point out to your subcommittee that you must separate the wheat from the chaff—you must know what is accurate and what is not in the statements that are being made before you. You must have observed the function of a jeweled watch company. You must know what the minimum level of production which each company can continue at and still break even. No American company can produce and continue to produce a product in which it does not make a profit, particularly when it can import that product at far less than it can produce it.

The Elgin, Hamilton and Waltham Watch Cos. and the Bulova plant are essential to the national defense of these United States. They can only be kept alive as long as there is an active work force manning the machines and producing jeweled watches on them. You cannot put this industry in mothballs and bring it back to life. You cannot obtain skilled workers by pulling them out of the blue sky and expect jeweled watch production. They must be continually employed by employers producing jeweled watches in the United States at a profit. The important decision your subcommittee must make is: does the best interest of the United States require you to determine that the American jeweled watch industry is essential to the defense of the United States? The decision is upon your shoulders whether we will be caught again as we were in World War II unprepared with insufficient facilities to do the job. We had over 8,000 employees in the industry then; we have 3,000 now. You be the judge.

Mr. CENERAZZO. Mr. Chairman, the questions that Senator Cooper and Senator Stennis have asked I think are important questions. Are the skills of the American watchworkers such that you can scatter them to the four winds and bring them back again? I think that is an awfully important issue in this whole essentiality problem.

Let me first illustrate to you how precise watchwork is, and how difficult it is for a worker actually employed on watchwork to make changes. I have been in this industry now since 1941. The industry is essentially an individual incentive industry. I have watched the arguments between workers on piecework and the management when new models are introduced.

In this industry a new model is introduced approximately every 2 years. For instance, our workers are working on an 8-0 watch at Elgin. The company decides to change over to 19-0, a little different size, because that is what is selling in the market. When that change is made, just a simple change from one size watch movement to another, the company has had to agree to pay 2 weeks' average earnings while workers change over from one model to the other.

Now, why is that? It is necessary because, when people working on individual incentive are required to shift to a new model their earnings drop as much as 40 and 50 percent on individual piecework. The workers are not holding back. They are actually trying, and still doing the exact same operation, the job description in every instance being identical, except it is a different size. It takes 2 weeks for an acclimation period from one size to another. If such a small change interrupts production by people who are continuously using their skills, you can get some idea what a long layoff would do.

Now let us look at the difficulty of changing from one kind of watchwork to another. In a watch factory, you have a series of departments. Let us take the plate department. The Elgin company decided when it started its Lincoln, Nebr., plant that the plate department was one which it would move out to Lincoln. It took the other people and passed them around to various other departments.

It gave a year's guaranty at average earnings to acclimate these people to other departments. And today, which is 8 years later, you will find people in the Elgin plant who still have not been able to get fitted to another job. They have not been able to make the grade on the other jobs that they have gone to, although they had worked for 20 or 25 years in the plate department.

And what happened out at Lincoln? Even though they took their top supervision, took the same foremen, the same job boss, the same setup men, the same key people out there, it was 1 year before this company started to produce plates, and it was almost 3 years before

they were producing them as efficiently as they were producing them at the Elgin plant.

I point this out to you because of the time element that is involved. With all the know-how, the same management, the same supervision. it took 3 years to go ahead and bring this about.

Now, what are some of the characteristics of a watchmaker? First, a person has to pass a perspiration test. A person who can handle a piece of metal only to find that the perspiration rusts it finds himself automatically eliminated, no matter what his I. Q. or his dexterity. That person is eliminated from working on watch parts, because every part he handles rusts, and automatically he is eliminated from production on watch parts. That is an important fact.

Second, watchwork is a repetitive process, day in and day out handling those small parts with an eyeglass, and if a person does not have the kind of mind that can acclimate him to this continual repetitive operation on tiny parts, he just cannot make the grade.

This industry is 60 percent women. We have women on skilled classifications, semiskilled, and unskilled. At the Elgin watch factory there are over 700 classifications of work. At the Hamilton watch factory, at Waltham, there are 700 classifications of work. At the Elgin plant, there are over 30,000 individual piece rates, a multitude of operations, where people do 2,000 of this today, and that is all the production schedule calls for, and then they go over to another operation and do 2,000 of something else.

But the person has to become acquainted with that work. If you knock them off for a week it takes them 2, 3, or 4 weeks to pick up where they left off.

I have seen toolmakers come into the Waltham watch plant during the war and work 2 days, and take up their toolbox and quit. Why? They just could not do that type of work. It was too tough for them.

Since Waltham cut down their production during the first reorganization and the second, you will find any number of Waltham's old employees in various factories in greater Boston making more money than they made in Waltham, because the watch industry has paid lower wages because of the Swiss competition. You go to those people and ask them to assemble at the watch factory, and you talk to them about patriotism, and are they going to give up their seniority in the plant they are working in?

Today Waltham has less than 400 people employed in that factory, less than 100 on watches. And most of the 100 on watches are working on some part of Swiss imports.

Waltham is going to make a profit importing Swiss watches. It is not going to make a profit manufacturing jewel watches against Swiss imports. It is going to become a Swiss watch importer. If it can get defense business to supplement Swiss watch imports it can spread out the additional overhead, but the fact remains that the Defense Department of the United States and the Government of the United States by failing to act to give this company support has deprived itself of a work force which can produce in time of war like it did in World War II.

Now, come to Elgin. At Elgin right now people are off a week, they were off a week in May, they were off a week in April. At Hamilton they were off a week in April, a week off in May, another week in June.

Why? Their production schedules are cut back. They cannot sell the watches they are making; their inventory is piling up. Those people, if they can find a job elsewhere, start looking around. The younger people between 20 and 40 can find other jobs. People over 40 are stuck because of the various benefits they would have—pension funds, group insurance, payment of old-age insurance, unemployment compensation, various factors. An employer does not want to hire older people because it costs them more for these benefits.

The older people are casualties. Today at Elgin, Ill., there are people with 15 years seniority laid off, that are experienced watch-workers and have no place to go. Hamilton Watch Co. also has people laid off that they just cannot bring back.

Now the answer to it is, if this industry is not declared essential to the national defense, there is not going to be any more watch industry in a very short time. The thing I cannot understand, very frankly, is, if we were not essential to national defense, why was it necessary to take this whole industry and conscript its entire production facilities from 1941 to 1945? Why was it essential to go ahead and let Swiss watch imports come in to this country and take the American watch companies out of the market in their entirety?

Look at what has happened elsewhere. You go to Pforzheim, Germany, a town of 30,000 people. In 22 minutes the British Air Force bombed that community and killed 23,000 people. Why? Because the home of the watch and clock industry of Germany was right there where they made the time fuses and mechanisms and Royal Air Force determined it was essential to knock that town out.

The British people, no more than us, are people that do not want to destroy entire communities. They only reason that was done was to deliver a telling blow to the Germans during that war so we could win the war. The British people determined that was essential and did it.

I would like to further point out that the Russian Government came over here in 1946 and they entered the Hamilton Watch Co. and saw Mr. Calvin Kendig. In came the Russians bedecked with ribbons and wanted to go through the plant. They wanted to go through and learn watch know-how. Mr. Kendig did not trust the Russians and said no, you can't. Immediately the Russians called Washington, the pressure went on him to try to give them access to the plants. He said nothing doing. He threw them out. They had a corps of engineers, they had a corps of people that wanted to find out the know-how of the watch industry.

Then you go to East Germany and find whatever watch and clock facilities were in the East German Zone. Mr. Shennan went over there to make a survey at the time of World War II and he can tell you that all the machinery was taken out of the East German Zone and moved to Russia.

There are only two plants Russia has and my authority for that is Hans Shaffner, the Director of Federal Economy of Switzerland, who told me there were only two plants in Russia competent to make jewel watch movements and they were not near the quality of ours. Mr. Shaffner pointed out that when a mission came after World War II that went into negotiation with the Swiss Government on trade, that the thing they wanted the most was watch machinery. They put the heat on little Switzerland, but Mr. Shaffner is a resourceful

negotiator. They held their ground and did not give up the watch machinery to the Russians.

The point I want to make is that Russia wants watch machinery. They realize it is an essential part of their war machinery. And yet we in this country make no effort whatsoever to preserve the skills of this industry.

Once these skills dissipate, how do you bring them back? You just do not bring them back. I think that failure to recognize this by your committee will mean the extinction of this industry.

Senator Cooper asked a very important question. Would we be here if it was not for the tariff? Senator, for 12 long years I have been traveling up and down marble hallways in and out of different departments of government and I have yet to meet the man who can knock your argument down in Government but there have been moves and important forces always at work to see that our case gets knocked out at a certain level. Why, I do not know. I think Americans in Government are fundamentally honest and sound but I know if you read the Swiss watchmakers' union newspaper you will find they take great pride in the fact that their language was used in President Truman's report in 1952 which denied the recommendation of the Tariff Commission for an increase in tariff.

I do not understand how an organization in Switzerland can get the CIO and AFL to go on the line against the watch industry of the United States. I do not understand how you can be against American workers and against an industry essential to the national defense, as the CIO and AFL have gone on record.

We are only a small industry. Right now there are less than 4,000 American watchworkers working on jewel watch movements, another 4,000 working on defense work. How far can you shrink? We are going to die. At Elgin and Hamilton slowly but surely the jewel watch work has been dissipating from under us. It cannot survive. Even if the tariff is granted by President Eisenhower before the 28th of July this industry cannot survive without supplementary efforts being made by the United States Government to preserve it. Why?

A minimum level of production of at least 4 million watches a year is essential in this country if you are going to have a healthy watch industry that can survive at a profit. Why?

Because the point of healthy operations of Elgin, Hamilton, Waltham, and Bulova is a total of at least 4 million watches a year. If those men testified under oath they would have to testify that is what would be the minimum level of production essential to go ahead and maintain a healthy watch industry. The tariff increase will not do it. Our position representing the employees of this industry is that it is our obligation as Americans to point it out to the highest authority in Government. We have gone to ODM. We have gone to the Secretary of Defense. It is interesting enough that Dr. Flemming and Dr. Hilliard sound extremely sympathetic to you. In Secretary Wilson, I never met a man more sympathetic nor one who understood the watch industry better. He gave me more arguments to preserve the industry than I had and I have been developing the argument 13 years.

I want to point out one final thing. You have a lot of witnesses. Failure of this committee to act and declare this industry essential to national defense will be giving the Russians a great advantage

because without a jewel watch industry available in time of war you cannot have an adequate fighting machine. The Japanese did not have an adequate fighting machine because they did not have the essential timing mechanisms and anybody that fought against them knows they did not have accurate timing mechanisms. The Germans could not do the job after Pforzheim was destroyed and the Communists cannot do a job against us if we have adequate timing mechanisms.

I am satisfied we should receive adequate protection. As long ago as 1936 Douglas MacArthur, when he was Chief of Staff, wrote to the Secretary of War that this was essential to national defense. The Munitions Board in 1950 said a minimum level of production in this industry is essential to national defense. The Munitions Board, the National Security Council in 1952 said so and Mr. MacArthur when Chief of Staff said so. Why is there any controversy? The doubt is raised because of a high-powered public relations campaign by the Swiss watch importers represented by able counsel who is former chairman of the Armed Services Committee, Millard Tydings. I say with all their high pressure I am satisfied the United States Senate will do the right thing and I hope you will weigh all the elements of this case.

Mr. TYDINGS. Mr. Chairman, I do not represent the Swiss watch industry and have never received a penny from them.

Mr. CENERAZZO. You represent Swiss watch importers who have a high-class name as the American Watch Association. Every one of them is a Swiss watch importer, Americans who are importing Swiss watches.

Mr. TYDINGS. I do not represent Switzerland because Switzerland might not like it.

Mr. CENERAZZO. I said you represented Swiss watch importers. I do not think Switzerland would hire you.

Senator DUFF. That will be part of the record.

Mr. CENERAZZO. I am sorry I got into a controversy with the former Senator.

Mr. TYDINGS. No controversy.

Senator DUFF. Senator Cooper?

Senator COOPER. I have no questions.

Senator STENNIS. I have no questions.

Senator DUFF. Thank you, Mr. Cenerazzo. It has been discussed by the committee that in view of the fact that we have had a number of witnesses for one side that for the time being it might be wise to have the other witnesses for the same side file statements for the record. We will hear one more witness in order and then adjourn until tomorrow morning at 10 o'clock.

There are going to be a number of important votes up in the Senate and we believe we should be up there shortly.

Mr. TYDINGS. Do you want to try to conclude today?

Senator DUFF. We will hear Mr. Greene, the next witness, and then recess until 10 o'clock tomorrow morning at that point.

TESTIMONY OF EDWARD GREENE, VICE PRESIDENT, GENERAL TIME CORP., NEW YORK, N. Y., ACCOMPANIED BY B. W. SAMPSON, OF THE WESTCLOX DIVISION, GENERAL TIME CORP., LaSALLE, ILL.

Mr. GREENE. My name is Edward Greene and I am vice president of General Time Corp., makers of Westclox clocks and watches, at LaSalle, Ill. And my associate who will assist in presenting some of this material is Mr. W. B. Sampson of LaSalle, Ill.

Senator DUFF. Do you have a written statement?

Mr. GREENE. Yes, sir. It is the statement of the Clock Manufacturers Association of America, Inc.

Senator DUFF. I wonder if you will file that. Then we can hear you if you desire in addition to your written statement?

Mr. GREENE. Yes, sir.

Senator DUFF. At this point without objection the statement on behalf of the American nonjewel watch and clock industry by the Clock Manufacturers Association of America will be made part of the record.

(The statement follows:)

STATEMENT OF EDWARD GREENE ON BEHALF OF THE CLOCK MANUFACTURERS ASSOCIATION OF AMERICA, INC.

The American timepiece industry—including manufacturers of both jeweled and nonjeweled watches and clocks—occupies a special position in relation to the national security. It applies and develops the unique science of horology, which requires specially trained and highly skilled personnel in the fields of horological engineering, toolmaking, poising, escaping, and other technical aspects of design and production. Horology is an altogether distinctive art. It has no counterpart in modern technology. It is not merely another form of precision manufacture. Generations of research and development have produced knowhow and skills which are not interchangeable with those of any other industry.

In peacetime the principal products of the horological industry are timepieces of all kinds—clocks, watches, scientific and industrial timing devices and controls, and the like. In time of war the industry becomes a veritable arsenal engaged in producing myriad timing mechanisms and other sensitive devices which the armed services require in enormous volume. Among these the most familiar example is the mechanical time fuse, whose rugged and minutely accurate timing mechanism is equivalent in principle and operation to a watch or small alarm clock.

The capacity for mass production in great volume is traditional in the timepiece industry. Clocks were manufactured by mass production methods in the United States some years before Eli Whitney's celebrated demonstration of interchangeability of parts in the standardization of firearms. Today the industry utilizes high-speed modern machinery and the most advanced techniques of manufacture.

Both the industry's knowledge of the art of horology and its extraordinary capacity for volume manufacture are immediately convertible to production for defense. This fact was dramatically apparent in World War II, when the entire industry engaged in designing and producing vital war material. The clock and nonjeweled watch segment of the industry, converted 100 percent to defense production, manufactured 3½ billion parts and components, and more than 25 million complete military items, for the armed services.

The mechanical time fuse, still the workhorse of modern ordnance, is only one of many items produced by the domestic horological industry. Other items manufactured by the clock and nonjeweled watch segment of the industry included such as the following:

Fuse and fuse parts for bombs, sea mines, rockets and flares.

Detonator for shells. Timers for bombsights, sea mines, antitank land mines, lifeboat transmitters, intercommunication units, battle announcing and many other war mechanisms.

Keyers for radios, telephones, beacons and other communication and warning devices.
Aerial camera components.
Airborne radar antennae.
Turn control (automatic pilots).
Precision optics.
Tubes for airplane engines.
Bore sight and intervalometer continuity testers.
Dial mechanisms for tank radios.
Intervalometers.
Accelerometers.
Camera overrun controls.
Field radio cases.
Course clock.
Averagers for sextants.
Antennae mounts for Signal Corps.
Demolition firing devices.
Incendiary bullet cases.
Direction finder, Link trainer.
Flasher unit, aircraft running light.
Commutator.
Dual motor and interrupter unit.
Bullet cores.
D. C. signal flashers.
Antiaircraft battery commander observation instruments.
Azimuth instruments.
Mine relays.
Listening devices.
Clock movements in recording instruments used in the manufacture of explosives, including the atom bomb.
Specially designed clocks used in the atom bomb test program.

Examples of typical defense items produced by this industry are exhibited for the information of the subcommittee.

From the beginning of the Korean conflict this industry was again called upon for the mass production of defense material, notably timing elements for artillery fuses. As late as September 1953, when cessation of hostilities appeared imminent, defense officials were encouraging overproduction of mechanical time fuses on ordnance contracts then outstanding.

But the industry contributes far more than quality and quantity production to the national defense. Difficult problems in research, development, and design have been undertaken and successfully solved. The speedy translation of ideas into design and production is commonplace. In one notable case, for example, an idea with respect to a time fuse of special function was engineered, designed, and placed on a volume production basis by a domestic watch and clock manufacturer, and will be described in the course of the hearing. This accomplishment was feasible because the kinship between timepieces and time fuses is so close that the same management, engineering personnel, skilled labor, and plant facilities in the horological industry are equally capable of producing both items.

Other countries recognize the immediate availability and ready adaptability of the facilities of their timepiece industries to defense production. A prime objective of Nazi Germany's economic warfare against England and France in the 1930's was the destruction of the timepiece industries of those two countries. This objective was achieved. The result was that, at the outbreak of World War II, England was acutely imperiled because she did not have a domestic source of production of mechanical time fuses. American horological companies supplied England's requirements on an emergency basis until the United States entered the war, and to a lesser extent afterward. Of this situation a study published by the Department of Commerce in the Foreign Commerce Weekly for January 16, 1950, gives the following account:

"The fall of France in World War II and the subsequent cutting off of trade with Switzerland resulted in an acute shortage of precision timing instruments needed by the British military establishment. Some relief was obtained by imports from the United States, but after 1941 the United States own requirements sharply curtailed supplies from this source. The then-existing British industry was too small for expansion on a mass-production scale. The United Kingdom was of necessity obliged to start from the primary stages of industrial tooling and labor training and produce as best it could the timing devices essential in modern military and civilian activites."

In 1945 the late Sir Stafford Cripps, then president of the British Board of Trade, described the seriousness of England's plight in an address to the House of Commons. He said, in part:

"* * * when the war came and we needed, naturally, to mobilize all the engineering resources we could muster, the inadequacy of the clock and watch industry left a very serious gap in what may be termed our industrial armory. The services required a great number of clockwork fuses, as well as clocks and watches.

* * * * * * *

"If we had had a considerable watch and clock industry earlier, not only should we have avoided the risks which are inseparable in such circumstances from dependence on overseas sources, but we should have had a reservoir from which we should have drawn machine tools, skilled labor and management well suited to the manufacture of many of these precision instruments upon which war so much depends today" (Parliamentary Debates, House of Commons, Official Report, October 16, 1945.)

Recognizing that the horological industry is of strategic importance militarily, other nations having horological industries—France, Germany, and Soviet Russia, for example—have established, or enlarged existing, horological plants capable of alternating between the production of civilian timepieces and the manufacture of mechanical time fuses as the circumstances require.

There is abundant and authoritative evidence of the essentiality of the American horological industry to the national security. In a recent statement Lt. Gen. Levin H. Campbell (retired), Chief of Ordnance during World War II, declared:

"Having the watch and clock industry as a going industry, equipped with the necessary plants, the necessary know-how, the trained people; it is of very, very great value to this country as a backlog and a safety for a rapid reaching of production in that particular item (mechanical time fuses)."

The critical importance of the domestic watch and clock industry to the national defense was tried and proved beyond question in World War II. It was reaffirmed in the Korean conflict. By way of corroboration is the near-disastrous experience of England which, in time of military crisis, was obliged to depend on overseas sources for time fuses for want of an adequate timepiece industry.

Subsequent portions of the testimony to be offered on behalf of the clock and nonjeweled watch segment of the domestic horological industry will deal with the development, redesign and production of the M–500 series mechanical time fuses as a prime illustration of the defense essentiality of this industry. In addition, the uniqueness of the industry's special skills and facilities, and their constant availability for the production of military items, will be discussed.

This committee's broad and intensive study will lend timely and much-needed clarification to the position of the American horological industry in our defense structure. We appreciate the opportunity to submit to the committee our experience and viewpoint upon this important subject.

Mr. GREENE. Senator, we thank you for the opportunity to present the essentiality of the nonjeweled watch and clock industry. There has been some talk of different segments of the American horological industry and we represent the companies which produce nonjeweled watches, pocket watches of that type and also clocks.

Senator DUFF. Will you start out by telling us for the purpose of the record what is the difference between a jeweled and a nonjeweled watch.

Mr. GREENE. One difference is price. Another is the difference in type of escapement. The escapement which we use in that type of watch is really a clock type escapement. It is what we term a pin-lever escapement whereas the jeweled-watch people use a jeweled lever escapement. Also another difference is in mass production of output. Our factory which turns out these watches and clocks at Westclox, Ill.—we turn out thirty-eight to forty thousand complete units per day whereas I think the jeweled-watch industry——

Senator DUFF. Is one of the distinctions one is machine-made in a sense and the other handmade?

Mr. GREENE. Not entirely; no, sir. Ours is made by machinery and the jeweled-watch industry also make their watches, the parts by machinery, but there are more finishing operations.

There are four companies which make these nonjeweled watches and we also make clocks.

There is our company, Westclox, at LaSalle, Ill., there is United States Time Corp. or Ingersoll, Ingraham Co., Bristol, Conn., and until recently when they discontinued making watches, the New Haven Clock & Watch Co. We 4 companies likewise make clocks and there are other members besides these 4 companies that make clocks in this country. I would like to submit for the record the members of the clock and nonjeweled watch industry in this country.

Senator DUFF. Without objection that list will be made part of the record at this point.

(The list follows:)

MEMBERS OF THE AMERICAN NONJEWELED WATCH AND CLOCK INDUSTRY

Borg Products Division, George W. Borg Corp., Delavan, Wis.
Chelsea Clock Co., Chelsea, Mass.
General Electric Co., Bridgeport, Conn.
General Time Corp., New York, N. Y.
William L. Gilbert Clock Corp., Winsted, Conn.
Herschede Hall Clock Co., Cincinnati, Ohio.
The E. Ingraham Co., Bristol, Conn.
Lux Clock Manufacturing Co., Waterbury, Conn.
New Haven Clock & Watch Co., New Haven, Conn.
Sessions Clock Co., Forestville, Conn.
Seth Thomas Division, General Time Corp., Thomaston, Conn.
Telechron Department, General Electric Co., Ashland Mass.
United States Time Corp., Middlebury, Conn., Little Rock, Ark., Abilene, Tex.
Westclox Division, General Time Corp., LaSalle, Ill.

Mr. GREENE. These topics which I should like to discuss and illustrate, first what has happened to and what is being done about the horological industry abroad?

Secondly, what our United States timepiece industry capacity and strength is in relationship to needs of war?

Third, what we clock-type watchmakers made in World War II, in the Korean war, and now make.

Senator DUFF. If I may take the liberty of suggesting in view of the fact that we are going to adjourn today in about 5 minutes, you can be heard tomorrow, sir, as the first witness. I feel myself and I do not know but what Senator Cooper might feel the same way, what is the difference in the contribution that the nonjeweled watchmakers make to the defense as compared to the jeweled watchmakers and the nature of the precision instruments?

Mr. GREENE. Well, I believe the first distinction would be a vast quantity of production. Our output of units in World War II was 3½ billion units, and in addition to that we made over 25 million complete units or components.

I think also that our distinction has been in the development of certain unique devices which did not require a jeweled escapement. These fuses which you see and which are illustrated utilize an escapement the same—the escapement which appears in a nonjeweled watch or nonjeweled clock.

There are no jewels in this type of fuse.

We have also done some original work in developing which has been built around a little sturdier type of watch movement. I have an illustration of that in this averaging sextant.

This device, we were called upon by the equipment division at Wright Field in World War II to see if we could develop around the time mechanism, a device for averaging readings in navigation of an aircraft. And we are very glad that we were able to solve it. This is about the best way of illustrating this, to hear the ticking which is exactly the ticking you would get from a clock when you push the top button. This particular instrument has been publicized. Machine Design and Engineering has fully described that particular instrument and Colonel Holliday, who was in charge of the Wright Aircraft Equipment Division in the war, characterized it as the most important development for air navigation since the development of the chronometer. It involves a very unique and a very unusual type of development. It was built entirely around the art of our industry.

One thing which our industry, our nonjewel watch and clock industry, has done which differs a little bit from possibly the jeweled industry is in relationship to the needs for war products outside of our borders.

Our company developed and started building a clock and watch factory in Canada some years ago and at the outbreak of World War II it was the only mass-producing clock and watch factory in the British Empire. Just recently or about 3 years ago the Canadian Government came to our Canadian factory and asked us after a survey of all industry in Canada if we would not undertake the development of a timing mechanism they needed in connection with their own armament. I am very glad that we were able to do so, that we were able to take hold of that and we are now producing these in great quantities in our Canadian factory for the Canadian Government.

There has been reference to the British Government needing a clock and watch industry and our company along with another nonjeweled watch and clock company. The United States Time Corp. has responded to the pleas of the British to build a clock and watch industry and we are today enjoying the largesse of the British Government in the development and in the manufacturing now of clocks and watches abroad.

Senator DUFF. I am sorry, sir, that we are going to adjourn this at 4 o'clock. The members have to get up to the floor. I had announced that it was the desire of the committee to meet tomorrow morning at 10 o'clock here but I have since been advised by the staff that the full Armed Services Committee meets at 10 and we will not be able to have a meeting while they are in session so we will have to change it to 2 o'clock.

I know that we all regret that we could not finish this today but that was beyond our control as a result of the proceedings on the floor.

Senator STENNIS. Who do your represent, sir?

Mr. GREENE. Westclox Division, General Time Corp., is the company I am associated with but also I am representing the entire clock and nonjeweled watch industry.

Senator DUFF. We will call you, sir, as the first witness tomorrow at 2.

Mr. TYDINGS. I will be the next witness after this gentleman.

Senator DUFF. Would you like to be the next witness after him?

Mr. TYDINGS. If that side of the case is finished.

Senator DUFF. I do not know whether any others propose to put in testimony or not. If so, we will afford them that opportunity.

(At 4 p. m. the hearing was recessed until 2 p. m. Thursday, July 1, 1954.)

ESSENTIALITY TO THE NATIONAL DEFENSE OF THE DOMESTIC HOROLOGICAL INDUSTRY

THURSDAY, JULY 1, 1954

PREPAREDNESS SUBCOMMITTEE No. 6,
SENATE ARMED SERVICES COMMITTEE
UNITED STATES SENATE,
Washington, D. C.

The subcommittee met, pursuant to call, at 2 p. m., in room 212, Senate Office Building, Senator James H. Duff, chairman; Senator John Sherman Cooper, presiding.

Senator COOPER. The meeting will come to order.

I am very sorry to say that Senator Duff has been detained and will not be here until later. Senator Stennis will be here in 15 minutes.

I have a letter here from Senator Langer of North Dakota, and a statement from Hon. Noah Mason, Representative from Illinois, and I will ask that they be placed in the record.

(The documents follow:)

UNITED STATES SENATE,
COMMITTEE ON THE JUDICIARY,
June 30, 1954.

Hon. LEVERETT SALTONSTALL,
Chairman, Committee on Armed Services,
United States Senate, Washington, D. C.

DEAR MR. CHAIRMAN: I should like to have this letter filed as a part of the record of the Preparedness Subcommittee No. 6, in connection with their study into the defense essentiality of the domestic jeweled watchmaking industry. I also wish to confirm the strong convictions I have always had with respect to the importance of this vital industry.

Last year, on March 4, 1953, I inserted in the Congressional Record, the results of a detailed study conducted in 1952 and 1953 by the President's Interdepartmental Watch Committee. These results were embodied in a summary that had been published by the National Security Resources Board, which concluded that the continued manufacture of jeweled watch movements was essential to the security of this country. This is still true today.

There are a number of reasons why the maintenance of this industry is absolutely indispensable to our national security—for example, the unique specialized skills that would be seriously dissipated if this industry should be permitted to die out; the tremendous volume of precision defense work that the industry performed during World War II and again during the past 3 years; and the contributions and achievements of this industry's research and development facilities in helping design and produce the ever-more-precise mechanisms demanded by modern warfare.

I am sure that this committee will hear about these significant and defense-essential attributes of the domestic watchmaking industry from others. I shall therefore limit these remarks of mine to a small but vital aspect of this problem—namely, the defense essentially of jewel bearings.

I can speak to this point with a considerable degree of personal knowledge, since the Defense Department has recently established in my State of North Dakota, an ordnance plant for the manufacture of military jewel bearings. This plant, which is operated by one of the domestic jeweled watch manufac-

turers through the use of some of its key supervisory staff, is now actually producing jewel bearings for military purposes.

Jewel bearings are the heart of jeweled watches, and of many precision instruments used in ever-increasing quantities in military equipment. During the early years of the last war, our defense officials made a grievous miscalculation as to the quantity of jewel bearings that would be required for military items, and the availability of facilities in this country to make them. Fortunately, however, the domestic watch manufacturers went ahead on their own to start building up a domestic jewel-bearing industry—so that, when imports of jewel bearings from Switzerland were cut off by the Germans in mid-1941, and the military departments began demanding jewel bearings in quantity and domestic facilities to make them, the jeweled watch companies had a good head start.

The World War II record proves that, when the need became acute, it was the jeweled watchmaking industry that was called upon to organize and develop from scratch a domestic jewel-bearing industry, a job which they performed magnificently. That record also shows that this industry is by far the best equipped in its facilities and skills to do this job. Although a few other companies were eventually brought into this program, they used tools and machinery which had been made by the jeweled watch industry, and the watch companies also had to give them considerable training and technical assistance to do the actual production job. Also, the nonwatch companies never approached the volume or quality of jewel production achieved by the watch companies.

Outside of our domestic jeweled watch industry, the only other source of jewel bearings in quantity is Switzerland. However, the World War II experience shows how unreliable that source would be in the event of any future conflict—and we may be sure that, in any such unhappy event, the Soviets would not permit the Swiss to ship such vital military items as jewel bearings to this country.

As I have said, jewel bearings are required in large numbers in such items as aircraft equipment, guided missiles, and military instrumentation of all sorts. It was this defense essentiality of jewel bearings that led to the establishment of the ordnance plant at Rolla, N. Dak.

If jewel bearings are so important to national defense that the Defense Department has undertaken to finance a plant to make them, and if jeweled watch manufacturers alone can make the machines and supply the technical assistance required to operate such a plant, I do not see how anyone could seriously question the essentiality of the jeweled watchmaking industry itself. Furthermore, it is the jeweled watch industry that plays the major role in designing and making the very precision items that use jewel bearings. If the defense agencies need the Rolla jewel-bearing plant, as obviously they do, then they must need also the industry that makes the things for which the jewels are needed—namely, the jeweled watch industry.

If only because of their role in the jewel-bearing picture—during World War II, currently, and for the tremendously expanded quantities of jewel bearings that will be needed in any future full mobilization—I am convinced that the domestic jeweled watchmaking industry must be kept alive as indispensable to our national security.

With kindest regards and best wishes, I am

Sincerely,

WILLIAM LANGER.

STATEMENT OF HON. N. M. MASON, REPRESENTATIVE OF THE 15TH DISTRICT OF ILLINOIS

Mr. Chairman and members of the committee, we have built up a watch industry in the United States that gives employment to scores of thousands of workers. These workers are paid a reasonably high wage that enables them to live decently upon a standard of living that is the highest in the world. Switzerland, under our reciprocal trade agreements program, has been dumping millions of watches on our American market at far less than it costs to manufacture them here. This has forced our factories either to go out of business or to go on part-time production. What is the difference between importing cheap labor to compete with our American labor—which our immigration laws

forbid—and importing the products of cheap labor to compete with the products of our factories—which our reciprocal trade program permits—thereby robbing our factory workers of their jobs?

Before World War II 47 percent of the American market for jeweled watches was supplied by imported watches from Switzerland, and 53 percent of the American market was supplied by our own American jeweled-watch industries. In 1936 we negotiated a reciprocal trade agreement with Switzerland. Later our American watch factories were retooled and converted for war needs, making precision instruments for the Army and Navy. Switzerland then took over the American market for jeweled watches to such an extent that by 1946 Switzerland supplied 86 percent of the jeweled watches sold in America.

Since 1941, when we entered the war, a total of 59 million Swiss watches have been imported. During the years 1945–48 an average of more than 9 million Swiss watches were imported each year. This importation of Swiss watches under our reciprocal trade agreement with Switzerland has seriously damaged our American watch industry. Today there are only three American jeweled-watch companies left in the United States—Elgin, Hamilton, and Waltham—and the Waltham Watch Co. is already bankrupt and in the hands of a receiver.

Mr. Chairman, the serious question concerning the American jeweled-watch industry is the important part it plays in national defense. It is absolutely essential that a pool or reservoir of skilled watchmakers be maintained, to be drawn upon in time of war to make precision time instruments—chronometers, fire-control watches, time fuses, aircraft instruments, jewel bearings, etc.—without which not a battleship nor a warplane can be operated, not a bomb can be dropped, not a torpedo nor a rocket bomb fired, until a delicate timing instrument to operate it has been installed. There is no other source for the kind of skill needed to make these precision instruments other than the jeweled-watch industry. Yet our reciprocal trade agreement with Switzerland has almost destroyed our American jeweled watch industry, an industry so essential to our national defense.

Switzerland has captured the world trade in jeweled watches. Even the American market has been taken over to the extent of 80 percent. Switzerland furnished practically all of the precision instruments used by Germany in the last war. She also furnished most of the precision instruments used by our European allies. She could do this because she was a neutral in the war. Do we want to become dependent upon Switzerland in time of war for precision instruments? Dare we risk such dependency?

Senator COOPER. A statement from Senator Kennedy of Massachusetts, and a statement of Representative Carl Curtis, of Nebraska have also been presented and will be placed in the record at this point.

(The statements follow:)

STATEMENT OF HON. JOHN F. KENNEDY, JUNIOR SENATOR FROM MASSACHUSETTS

I appreciate very much the opportunity to present to this subcommittee my views on the important question which you are considering today: the essentiality of the jeweled watch industry to our Nation's security and defense.

There are many aspects of the international trade policy of the United States upon which reasonable men can differ widely. There is, however, one aspect of this matter upon which almost all are agreed. I have reference, of course, to the requirement that those domestic industries which are vital to the defense and security of this country must be maintained in such a condition of readiness that in the event of a major national emergency, those essential industries will be able to assume immediately the roles required of them in our total national effort. I must certainly conclude from all of the statistics and information that have come to my attention that the jeweled watch industry is in this category.

The demands made upon the industry during World War II and during the Korean campaign and the remarkable manner in which the industry responded is well known to all. I will not burden the subcommittee with a recital of the pertinent statistics which I know will be fully developed by the many witnesses who will appear during these hearings. I will say, however, that the time required to train properly the many highly skilled technicians required to meet the demands made upon the industry in time of national emergency is astonishing. In past wars the United States has always had sufficient time to mobilize for all-out military participation. This, of course, is a situation which is not likely to be repeated in the event of another global war. Certainly the 5 to 10

years required to reestablish an industry like the jeweled watch industry makes it imperative that the industry be maintained at the "ready" level.

That must be our goal—the question is, how is it to be achieved? Certainly the nationalization of the industry and its operation during peacetime at levels necessary for the country during times of great national emergency is an untenable solution. The direct payment of subsidies by the Government to the industry to maintain proper levels seems equally undesirable. It is impossible to stockpile the products which would be needed in the event of war since the research, development, and specific needs of the future cannot be predicted. It would seem, therefore, that the industry's position that increased tariffs on imported watch products would result in a healthy domestic industry which would be maintained at proper levels of employment to assure vital defense production in the event of necessity merits some very careful consideration by the Congress, and highlights the importance of the amendment to the Trade Agreement Act, as approved by the Senate, providing that there shall be no decrease in the tariff on articles necessary to meet national defense requirements determined by the President where the ability of the domestic industry to meet those requirements would be threatened by a tariff reduction.

Any realistic observer of the international trade situation must admit that the present trend in national policy is toward the promotion of international trade and the lowering of tariff barriers. However, the watch industry, the optical industry, and any other industry requiring the services of highly specialized and highly trained personnel who can be brought to the stage of training necessary only after many years of apprenticeship and development deserve special attention.

I was pleased to learn that the President had ordered the Office of Defense Mobilization to inquire into the peculiar problems surrounding the jeweled watch industry and others similarly situated and it is reassuring that this subcommittee is devoting attention to this serious problem. It is my hope that, as a result of this day's hearing, the Office of Defense Mobilization will give additional detailed study to the relationship existing between this country's jeweled watch industry and the national security with a view toward initiating appropriate legislative action in the next session of Congress.

STATEMENT OF HON. CARL T. CURTIS, REPRESENTATIVE OF THE 1ST DISTRICT OF NEBRASKA

Mr. Chairman, this will be a most useful and constructive hearing if it serves to bring to focus attention upon the need for immediate action to save an industry that is essential to our present and future national military security. For a number of years, I have been trying to see that we do not lose the invaluable military asset which we have in the jeweled-watch industry. During the hearings of the Committee on Ways and Means on the Trade Agreements Extention Act of 1953, I pointed out that the National Security Resources Board had reported to the President in January 1953, that the jeweled-watch industry was essential to our security and that no decline in the absolute level of watch production by the industry could be permitted without impairing the safety of the country. Since that date the level of production has declined sharply. The Tariff Commission—the fact-finding body of Congress—has recommended an increase in duties. It seems to me that we must do whatever is necessary or appropriate to bring the seriousness of this situation to the attention of the President.

Our long-established American jeweled-watch industry and its workers—and the nonjeweled watch and clock industry, as well—deserve and urgently need this country's special consideration and help in order to survive. But the country itself has an even greater stake in their problem. This industry has demonstrated under great stress that it possesses a unique knowhow and facilities for supplying our Armed Forces with essential instruments, devices and mechanisms which no other industry or group of workers is similarly equipped to do.

Yet despite proof of its vital essentiality during World War II, during the Korean struggle and our continuing drive to rebuild our defenses, our domestic industry is being rapidly smothered by low-cost foreign competition and now is sorely pressed for survival. Jeweled-watch production has dropped nearly 50 percent in this country since 1951 and employment of skilled watch workers, whose training has required many years, has dropped about 47 percent. If this

rate of attrition continues there will be no jeweled-watch industry available to meet military demands within the next 2 years.

The reason for the steady decline suffered by this important industry is clear. The ever increasing flood of cheap Swiss watches and watch movements into this country has given the Swiss watch cartel almost 85 percent of the American watch market. The American industry could solve this problem—as it may be forced to do—by importing all timing mechanisms from Switzerland and abandoning all development and production work. I know that the Elgin National Watch Co., which has a plant in my State, is turning to importation at a very rapid rate. That would be good business—for under our present trade agreement with Switzerland, Swiss watches can be imported far more economically than they can be manufactured in this country. The Swiss pay about 60 percent less in wages than the American companies for comparable watch manufacturing jobs, and about 80 percent of the cost of a watch goes for labor.

If the entire American industry is forced to turn to imports for its business salvation, it then becomes a mere assembly industry, not a developing or producing one. If it turns to other products, its watchmaking skills will be lost.

That would leave this country dependent solely upon landlocked Switzerland for timepieces, timing devices for fuzes, jewel bearings and instruments, which will beyond question be needed in huge quantities in the event of another war. If Switzerland again were to be surrounded by our enemies—as she was by Nazi Germany in World War II—where will our Armed Forces obtain the timepieces and timing devices needed for the weapons of today and tomorrow?

If, through lack of patriotic foresight and plain military commonsense, we allow the domestic jeweled watch industry to be further imperiled to the point of complete destruction, we imperil the lives of our soldiers, sailors, and airmen of the future and the success of our military operations.

I hope most sincerely that the report of this committee will make this clear to the Government and to our people.

Mr. TYDINGS. Mr. Chairman, may I respectfully make a suggestion to you. I know how busy you gentlemen are, and I assume you want to get through with these hearings as rapidly as possible. If it is convenient to you and the other side, I would suggest that this afternoon we might be able to divide the time. I represent a lot of people who would come down and testify, but I have persuaded them not to come in the interest of speed. I would like time enough to answer some of the arguments made on the other side.

Senator COOPER. I am going to call the list of witnesses to speak, if they are here and ready to testify, and if there are other witnesses who want to testify.

Mr. Edward Greene.

Mr. GREENE. Yes, sir.

Senator COOPER. You are going to testify?

Mr. GREENE. Yes, sir.

Senator COOPER. Mr. George Smith.

Mr. SMITH. Yes, sir.

Senator COOPER. Mr. Dudley Ingraham.

Mr. INGRAHAM. I would like to testify, yes.

Senator COOPER. Mr. Edward Carmody.

Mr. CARMODY. Yes, sir.

Senator COOPER. Is there anyone else other than Senator Tydings that expected to testify, or requested to testify?

(No response.)

Senator COOPER. There are only four. I am going to suggest that they appear as witnesses and testify as such reasonable length of time as they desire, and then Senator Tydings, suppose you follow, and take such time as you think necessary.

Mr. TYDINGS. I think I can do it in an hour. I certainly will stay within an hour. But since it is necessary for one witness to answer all of it, I have to have a little more latitude.

Senator COOPER. We will give you time.

Mr. TYDINGS. Thank you, sir.

Senator COOPER. I am certain that Senator Stennis will be here. He told me he would be here at 2:25.

Mr. Greene, if you want to start testifying, you can pick up where you left off.

TESTIMONY OF EDWARD GREENE, VICE PRESIDENT, GENERAL TIME CORP., NEW YORK N. Y., ACCOMPANIED BY B. W. SAMPSON, OF THE WESTCLOX DIVISION, GENERAL TIME CORP., LaSALLE, ILL.

Mr. GREENE. I am Edward Greene of General Time Corp. I represent the four pin-lever watch companies and the clock industry.

Senator COOPER. I might say for the record that Mr. Greene and myself were schoolmates for 3 years at least some 30 years ago. I am glad to see you.

Mr. GREENE. We are an integral part of the American horological industry. Yesterday Senator Duff inquired about the differences between the jeweled and pin lever watches. I think the clue is in the description of the terms.

Jeweled watches use jewel bearings in their escapement, whereas we insert hardened steel pins and hardened steel bearings in our escapements.

We utilize the same skills with the exception of the jewel-making skills in both industries. We are both mass producers, except that we are dealing in tremendous quantities. We make millions, whereas the jeweled watchmakers are usually makers of smaller quantities. When we tool up, we tool up for very rapid reproduction of parts, which have to be very exactly made, because there is no finishing or custom fitting later.

There is that one difference, although we really supplement each other to a great extent. Of course, we both have the knowledge of horology which is this vital element in all these time mechanisms, particularly fuses.

We were rather surprised yesterday that some of the Government witnesses seem to be unaware of the role that we played in making these mechanisms so I would like to show you a few of the types and the wide range of products which our industry produces. I would like to say that we in the industry have made over 3½ billion parts of defense items. Our company alone has turned out over 10 million fuses.

So our industry is the great mass producer. We economize in material and in price accordingly. I would like to show you a few samples of some of the items we manufacture.

Senator COOPER. May I ask a question or two?

Mr. GREENE. Yes, sir.

Senator COOPER. How many companies of your type are there?

Mr. GREENE. There are four. There is the Westclox Division of General Time Corp., the E. Ingraham Co., Bristol, Conn., the United States Time Corp., Middlebury, Conn., and New Haven Watch & Clock Co., New Haven.

Senator COOPER. How many people are employed by these concerns?

Mr. GREENE. I do not know in all the different branches of the companies. I know now that our employment has dropped enormously in

the watchmaking skills. In the watchmaking skills before the war, we employed around 4,300 people. Now it has fallen to 2,100.

Senator COOPER. Your company now employs 2,100 people?

Mr. GREENE. No, the four companies; in watchmaking only.

Senator COOPER. Are those 2,100 watchmakers?

Mr. GREENE. Employed in the making and turning out of watches, yes.

Senator COOPER. Yesterday representatives of the jeweled-watch companies testified. One argument they made on the essentiality of the watch industry to defense was that they made jewel bearings which were used in tremendous quantity. I think one witness testified 75 million jewel bearings. Of course, your companies do not make those jewel bearings.

Mr. GREENE. No, sir.

Senator COOPER. The other argument they made was that their watchmakers had such peculiar skills and skills peculiar to the industry which were not held by workmen in other industries, and which were particularly appropriate for all of these precision mechanisms used in weapons. Is there any difference in the type of skilled workmen that your company employs than the jewel companies employ? Are their workmen more highly skilled?

Mr. GREENE. I would not say so. Other than the jewel-making skills, the skills are pretty much the same. There is however more specialization in some directions. I think in certain cases of toolmaking where we require very high precision and rapid production of tools, so that the parts can be turned out in enormous quantities, there may be a little difference in the skills. We think our skills in that respect are probably of a little different nature than those employed in the making of tools for the jewel-watch industry.

We supplement each other. Our strong point is huge volume production. Our company, as I mentioned yesterday, turns out 38,000 timepieces a day, and when we go to make these fuses, we make thousands. One company alone is capable of turning out parts for 60,000 fuses a day. You can see that in the type of fuses which we make. This is a breakdown of the fuse which is the workhorse of modern warfare. This is used in antiaircraft shells, in bombs, and it has an enormous application. These are made in the millions. They are not made in thousands, but millions. There are over 140 parts going into 1 of these fuses. It requires the same skill in making the machines and setting up the machines and making the tools which will pound out and stamp out the parts in these enormous quantities.

Some of these other fuses I would like Mr. Sampson to show you because he is more familiar with this.

Senator COOPER. Your workmen make the tools which make these parts?

Mr. GREENE. We make the tools, we make the parts, and in some instances we even assemble them. This particular fuse we make everything from soup to nuts. In other instances, we have supplied certain integral parts to a lot of other companies and enabled them to take those parts and to assemble them, and to assist in that way in the final assembly. But the fabrication of this in our factories is complete.

Senator COOPER. You have a large number of parts on the board there. The argument of the witnesses yesterday was that there was no other group of workmen who could, without long training, I would

say, be available to do the type of work that they were doing, which they said was essential to defense.

Are there other workmen in other industries that can do the kind of work that you have on the board there?

Mr. GREENE. No, sir.

Mr. SAMPSON. These plates up here are the same type of plate used in a watch or clock with different punching and drilling. The same skills in making these plates are used in the manufacture of a watch or clock.

Mr. GREENE. This is a watch plate. This shows the same type of work which we do in making these fuses that are used in making these watches.

Mr. SAMPSON. This is an averaging sextant made for navigation that is operated around the clock. This is a rate gyro used in guided missiles and gun sights and also has clock parts in it. These are aerial bomb fuses of a different nature that are mechanically timed, using a watch or clock mechanism. These parts are made by the hundreds of thousands.

In this cutaway, you can see the clock type movement that starts the part in operation. Another type is used in detonating whatever it hits. This is an indicator that is used in aircraft. This is another type of gyro which is used in aviation. All these parts have clock mechanisms in them. This is a fire-control mechanism used on weapons in aircraft. This is an antiaircraft control weapon that you can see uses clock skills.

This is another type of sextant used in aviation. This is another type of bomb fuse that is used. These look similar, but they have different applications as far as warwork is concerned.

This is another one. Here is a cutaway section that permits you to readily see the clock and watch mechanism in there. This is an aircraft actuator. This is an oil pressure gage that uses clock mechanisms.

This is an underwater fuse used by the Navy, and it is clock mechanically controlled. Another type of time fuse that was made for the British, because they did not have any horological industry in World War II, and these were the only type of these fuses that they had in World War II until the United States entered the war.

This is another type of aerial fuse. This is a movement that is called the M–30 fuse, and was made by the hundreds of thousands during World War II. This is a bomb fuse that is mechanically time controlled. This was needed in millions during World War II.

I might say during World War II there was never a time that the American forces were on the safe side of mechanical devices, because I happened to be in a position to know that. It was not until the war was over that mechanical time fuses were off the critical list. The same thing repeated itself during the Korean war. This particular fuse was on the critical list until 20 days after the shooting stopped in Korea.

Senator COOPER. What fuse is that?

Mr. SAMPSON. M–500 series artillery fuse.

Senator COOPER. What is it used on?

Mr. SAMPSON. It is used on the 57, 75 and 105 howitzer. It has a lot of uses. I might say these were made by the hundreds of thousands, but it was taken off the critical list about 15 to 20 days after the shooting had stopped in Korea.

These particular parts here have no clock mechanical movements. However, they are jacks used in aircraft which do take considerable work at close tolerances. There are others we did not bring because of security regulations. There are many more, but we thought that was enough to indicate to you the wide range of application of our skills to defense.

Senator COOPER. Your company is now making these parts?

Mr. SAMPSON. We make the parts, the complete assembly, and those people who cannot make the parts but can assemble, we make the parts for them.

Senator COOPER. Do you say that only workmen who have been trained as skilled watchworkers can make these, or do you say that they can make them more quickly and get into the manufacture of these more quickly or in greater volume? You mean to say that no one can make these except people who have been trained to do watchwork?

Mr. GREENE. Not as fast and as quickly as we can. We can turn our watch and clock production today, and we can tune up the machines, and if the designs are accepted, we can make these parts immediately. We can turn off one and start the other. There is no other industry that can do that.

Senator COOPER. Do you know any other companies, other than watch companies, that are making these parts?

Mr. GREENE. Some of them have gotten into making some of these parts since then.

Senator COOPER. Do you know what companies they are?

Mr. GREENE. I understand Eastman Kodak and International Business Machines are making some, but it has taken those companies years to get to where we can do it in months. I think this is so pertinent I would like to quote something that Sir Stafford Cripps, president of the board of trade, made to the House of Commons in October 1945, which brings out this point very clearly.

> Before the war the committee will appreciate that, though this country manufactured a certain number of high-grade clocks, practically the whole of our requirements, as regards ordinary clock and watch trade, were imported from abroad * * * when the war came and we needed, naturally, to mobilize all the engineering resources we could muster, the inadequacy of the clock and watch industry left a very serious gap in what may be termed our industry armory.

That is a sort of quaint phrase, isn't it. This is what the British did. We are "taking steps to encourage the large-scale production of watches and clocks in this country itself."

I can speak on this very directly, because our company accepted the invitation of the British Government to start making clocks and watches in the United Kingdom. The United States Time Corp. did likewise. I must say it has been a very, very nice agreement, because these are some of the terms of the agreement that they made.

There will be quantitative restrictions of imports on clocks and watches. The other day I heard somebody say that quantitative restrictions belonged to the dark ages, but yet the British Empire has already established quantitative restrictions of clocks and watches. Secondly, import duties on alarms will be increased from 20 percent to 33⅓ percent. That was a very nice arrangement.

Thirdly, the Government will place orders for clocks and watches for the services with British producers.

I would like to insert this little thought. The British Government has been very forthright as to the procurement of their war materials

from British sources. Should our own Government take the same steps today because of certain cutbacks? We are laying off some of the people that are making some of these fuses, and yet our Government is procuring from overseas sources some of the very fuses which we have designed, and which they are now making. I think some of our people would appreciate that work. I just insert that as a thought.

Senator COOPER. Where are fuses being made outside the United States?

Mr. GREENE. France; Italy; the Lipp Co. in France; in Germany.

Senator STENNIS. Did you say they were making your pattern of fuses?

Mr. GREENE. Yes, sir, the same fuse.

Senator STENNIS. Why do they do that?

Mr. GREENE. I think they have done so probably to set up a second source of supply to supply the troops over there readily with those. But now that we are laying off hundreds of people with the recent cutbacks in fuse procurement here, I think our people would appreciate being able to make some of those.

Another thing which they did which was very helpful in encouraging our industry over there was to establish a national college for clock and watch manufacturers, which was really quite a thing. It helped us get our skilled help rather quickly.

Finally, they made some very easy rent arrangements with us. In fact, I am afraid that some of my competitors' tongues will hang out, because when they hear of the wonderful climate the British Government has created for us there, it has been a very fine thing. It has been a very cheap investment for the British Empire to make, because they have been able, using the quaint phraseology of Sir Stafford Cripps, to get a considerable industrial armory at a very low cost.

I would just like to comment that other countries throughout the world have likewise fostered the clock and watch industry. In fact, the United States is the only country where one sees the spectacle of the Government standing by and letting an essential industry disintegrate.

I would like to insert these comments of Sir Stafford Cripps in the record, because I think it is very, very important.

Senator COOPER. They will be inserted in the record.

(The exhibit follows:)

[From Parliamentary Debates, House of Commons, Official Report, Tuesday, October 16, 1945]

CLASS VI—BOARD OF TRADE

Motion made, and Question proposed,

"That a Supplementary sum, not exceeding £200,000, be granted to His Majesty, to defray the charge which will come in course of payment during the year ending on the 31st day of March, 1946, for the salaries and expenses of the office of the Committee of Privy Council for Trade, and subordinate departments, including assistance to the watch manufacturing industry in Great Britain and a grant in aid."

THE PRESIDENT OF THE BOARD OF TRADE (SIR STAFFORD CRIPPS). This is a new matter, and perhaps I may be allowed to give a short explanation of it to the Committee. Before the war, the Committee will appreciate that, though this country manufactured a certain number of high-grade clocks, practically the whole of our requirements, as regards the ordinary clock and watch trade, were imported from abroad. Over 7,000,000 watch movements and about 5,000,000 clock movements were imported into this country annually, and, when the war came and we needed, naturally, to mobilise all the engineering resources we

could muster, the inadequacy of the clock and watch industry left a very serious gap in what may be termed our industrial armoury. The Services required a great number of clockwork fuses, as well as clocks and watches.

By the time the peak production had been reached during the war, we were able, broady speaking, to provide the first two of these—clockwork fuses and clocks—in adequate quantities, but we have only recently reached the production stages for watches, and that only on a comparatively small scale. Consequently, we had, even in war, to import our requirements of these, and also of an item which a good many hon. Members will remember from their correspondence—alarm clocks, which were one of the essential civilian needs. If we had had a considerable watch and clock industry earlier, not only should we have avoided the risks which are inseparable in such circumstances from dependence on overseas sources, but we should have had a reservoir from which we should have drawn machine tools, skilled labour and management well suited to the manufacture of many of those precision instruments upon which war so much depends to-day.

The civilian population has, of course, during the war, been kept extremely short of both watches and clocks, and the knowledge that we were bound to continue a tight control over imports for a considerable time until we could see our way through the difficult problem of the balance of payments provided a second reason for considering the steps necessary to encourage the large-scale production of watches and clocks in this country itself. Accordingly, the Coalition Government invited me, when I was at the Ministry of Aircraft Production, to examine this problem with the other Ministers concerned and with the industry, and my hon. Friend the Member for Mid-Bedfordshire (Mr. Lennox-Boyd), then Parliamentary Secretary to the Ministry of Aircraft Production, did a very excellent piece of work in conducting the whole inquiry for me, and the conclusions reached by that inquiry were endorsed by myself and the President of the Board of Trade and approved by the Government last May. The present Government is in full agreement with those conclusions. Although this Committee is concerned to-day with only one of the measures which were proposed, I think it may be of assistance if I were to take this opportunity of stating briefly the other main conclusions that were reached.

First, in view of the balance of payments difficulties, to which I have already referred, quantitative restriction of imports of clocks and watches is bound to continue for some time at least, but, in deciding what imports we must licence, we shall, of course, have regard to the quantity of home-produced clocks and watches. The industry has been informed of this fact, and it is hoped it will take this opportunity of putting itself on a fully efficient basis to supply our own needs and also, we hope, to make a contribution towards our exports. Secondly, import duties on alarms and other cheap clocks were reduced to 20 percent and 25 percent ad valorem respectively to implement the Anglo-German Agreement of 1933, and the last Government agreed to bring these again into line with the duties on other clocks and watches, namely, 33⅓ percent ad valorem, and a Treasury Order to that effect was made in July last. Thirdly, the Government will place orders for clocks and watches for the Services with British producers to the fullest extent practicable, always having regard to the fact that the Services must have the best equipment and that we must have it at a reasonable price. Fourthly, in order to build up a body of highly trained technicians, the provision of facilities for technical education is essential. My right hon. Friend the Minister of Education has decided that a National College for Clock and Watch Manufacture is needed, and she is taking steps to get this established in the near future.

These measures should enable us to build up an efficient industry so far as clocks are concerned. It is clear, however, from all the advice we have been able to secure, from our own wartime experience in production and a detailed cost investigation, that more will be needed if we are to establish ourselves firmly in the watch manufacturing field. Some firms, it may be, will be able to go ahead without further assistance than that I have already described, and we shall do all we can to make their projects a success. We are satisfied, however, that the hazards and difficulties are such that development of what amounts to substantially a new industry upon a sufficiently large scale will be unlikely without that degree of Government support, encouragement, and supervision which can only be secured by some participation by the Government in the risk.

Accordingly, it is proposed that the Government should acquire and lease on easy rental terms the essential plant for a limited number of selected manu-

facturing projects. Pending the submission of these proposals to Parliament, those who it was thought might make a contribution to the problem were invited by the Ministry of Aircraft Production to discuss possible arrangements. Some proposals have already been submitted and others are expected to be submitted shortly, but, to enable assistance to be given immediately to the projects selected, this Supplementary Estimate is presented in advance of such legislation as may ultimately prove to be necessary.

The broad outlines of the scheme are that essential plant will be leased to the selected firms for 5 years at a rental of 4 percent per annum on the initial value of the plant, and the firms will be given the option to purchase the plant at the end of the term at the then fair market price. In other words, the firms will have been relieved of depreciation for the duration of the lease. As a condition of this assistance, the firms will be required to make full use of the plant, to undertake research and development and take all possible steps to reduce their costs, so that British watches may become, as rapidly as possible, as competitive as those made elsewhere. The forecast of £1,000,000 mentioned in the Supplementary Estimate as the total of plant to be provided is the amount which we think will be needed to start an industry basically sound and capable ultimately of meeting a large part of our demand for watches. Some part of the plant will come from Government surpluses. If we assume a rate of 15 percent for depreciation per annum on the initial value, the assistance to the industry over the 5-year period will amount to 75 percent of the value of the plant provided, and that will probably be somewhere between 5 and 10 percent of the total cost of production during that period.

If we can so establish an efficient watch-manufacturing industry at so small a cost, I am sure the committee will agree that the money will be well spent. It is to be observed that some of these projects are being placed in the development areas, and also, in one case, it is contemplated that a factory, where certain types of watches have been manufactured during the war, will come into use. I trust that, with that short explanation, the committee will agree to the estimate.

Mr. LENNOX-BOYD (Mid-Bedford). Whilst thanking the right hon. and learned Gentleman for his kind reference to myself, I would like to say how deeply this House and this country will be indebted to those officials of the Ministry of Aircraft Production who, at the height of the aircraft programme, in one of the worst periods of the war, gave such unstinting service in carrying out the inquiry on which this estimate is based. I think it will turn out to be a very important day in the history of British industry, and that from these small beginnings something very valuable to our life and trade may well spring. As the right hon. and learned Gentleman said, we shall have the beginning of a very valuable industry here—the clock and watch industry. We shall be able to cut down imports at a time when it is imperative to do so. We shall be able to keep skilled labour in that field of high precision engineering in which we are unequalled, and we shall also be able to keep up to date in a vital field of defence and be able, should the need ever arise, to expand rapidly. I am glad on behalf of the Opposition to wish this venture every possible good fortune. The high precision firms to which we shall have to look in the future have in the war, by their hard work, their ingenuity and their courage under enemy attack, given us a very rich harvest of engineering achievement.

I am glad that the Government have realised the value of these private firms and the need and the propriety of giving them assistance in the difficult teething period of tooling-up on an expensive and elaborate scale for goods which in the early stages are bound to yield only an unremunerative return. I believe that given the good will and support which all sides of the House will be anxious to give, we shall draw from these firms in peacetime dividends as rich and valuable as they have given us in war.

Mr. GODFREY NICHOLSON. I hope the right hon. and learned Gentleman will bear in mind not only the big firms but the smaller ones. Some of the finest craftsmanship in the watch-making industry exists in very small firms employing perhaps four, five, six or seven men. I could show him cases in London in the Clerkenwell area where firms like that have rendered eminently valuable service to the country during the war, having been engaged on Admiralty and other contracts. They show that they possess as high a level of craftsmanship as could be found anywhere else, and it would be a thousand pities if this admirable venture, on which I congratulate all concerned, ignored these small firms.

Question put, and agreed to.
Resolved:
"That a Supplementary sum, not exceeding £200,000, be granted to His Majesty to defray the charge which will come in course of payment during the year ending on the 31st day of March, 1946, for the salaries and expenses of the office of the Committee of Privy Council for Trade, and subordinate departments, including assistance to the watch manufacturing industry in Great Britain and a grant in aid."'

Mr. GREENE. Likewise, I would like to insert into the record the list of military items which our industry has made. Most of these items were produced in their entirety in the industry. Work on a few of these items included only the critical timing mechanisms finished in subassembly form for inclusion by other assemblers into the completed product. I want to add some that are not on the list, because I think it is so very, very important that we understand that this industry alone is able to make some of these devices.

We made aerial camera components and airborne radar antenna, tubes for airplane engines, field radio cases, antenna mounts for the Signal Corps, flasher units, commutators, listening devices, antiaircraft battery commander observation instruments.

I should like to emphasize the clock units and recording instruments used in the manufacture of explosives including the atom bomb, specially designed clocks used in the atom-bomb program.

May I file that as a part of the record?

Senator COOPER. Yes.

(The information follows:)

A PARTIAL LIST OF MILITARY ITEMS PRODUCED BY AMERICAN CLOCK AND WATCH INDUSTRY

Anti-aircraft fuses, fuses for heavy bombs, Brant fuses, antipersonnel mine fuses, important timing mechanisms for proximity fuses, time fuses for howitzers, timing mechanisms for demolition units, gyroscope devices, navigational instruments, aircraft turn and bank indicators, gyroscope units for gunsights, aircraft air speed indicators, United States Navy marine clocks, Navy timing devices, range-finding trainers, radio sound trainers for antisubmarine work, fine control mechanisms for Navy ships, averaging unit for sextant, marine chronometer, elapsed time clocks, master navigation comparing watches, hack wrist watches, stop watches, railroad watches, aircraft clocks.

Mr. GREENE. I also want to comment on the health of our industry. In 1941 we turned out 10 million watches on a 5-year average prior to that date. Last year in 1953 we made a little over 6 million watches. The trend has been down, and if it is projected, we will be extinct and liquidated by 1963. Translating that into terms of our employment; at the time we were making around 10 or 10½ million watches—I am talking only about watches—we employed around 4,300 watchmakers. Now it is down to 2,100. We have lost 52 percent of our watchmaking reservoir of skills.

Senator STENNIS. You are speaking for your company now?

Mr. GREENE. I am speaking for pin-lever watch people. This is the type of product which we make.

Senator STENNIS. Go ahead; I am listening.

Mr. GREENE. That concludes my testimony. I will be very glad to answer any questions that you may have. There is one question which came up yesterday which I would like to answer, because I think it is a question which goes right to the root of the problem. The question

was, suppose your skilled help leaves, and they get into some other industry; will they not be available then as a pool or reservoir so that when we need all these things, we will be able to make these parts?

I say absolutely not. The reason for it is this: Watchmaking requires a team. You have the skills, you have the facilities, and you have management. I do not mean we vice presidents or presidents. I mean some of the people down in the shop that really do the layout work. Take any one of these fuses. The first thing that you start out with is an inventor, and an engineer, and he is cooped up and he thinks "I can do it this way or that." He may work out a model. Then it goes to the model room, where experts start making a model. Then after they have a model, it goes to the factory and the factory says "Yes," but it won't work because you can't make it this way. Then it goes to layout men, and they will take it and figure out how it can be changed so we can make it. Then it may go to a plant chemist to decide what kind of oil will be needed and then to a metallurgist to decide what kind of metal is needed, and possibly it goes to the foreman of your screw-machine department, and he says, "I don't think you can hold it to those tolerances," and he will say it might have to be undercut here, and he will make his suggestions.

Finally it will go to the inspector, and he will say, "Your tolerances are not right. It won't check out."

Then the purchasing agent comes in and says, "I know where you can get the steel and alloy."

It is a team. If you take part of it away, the thing will not work. It took our company over 7 years with the mothering and the spoon-feeding from our plants in this country including sending over everybody, foremen, and plant workers, and inspectors, to Scotland to get that little factory going there. It took 7 years before we were able to get rolling on production.

I say there is not any company or any industry that can do our work as fast or as quickly or as economically as the watch and clock industry can.

Senator STENNIS. How did that industry die in England?

Mr. GREENE. That is a very good question. The Nazis deliberately went out and subidized their exports into England, so that they killed off the clock and watch industry in England. The English used to be the best watch and clock people in the world.

Senator STENNIS. When was that?

Mr. GREENE. Back in the early 1800's, a long time ago. I think some English carpenter invented the first chronometer, and got a prize from the British Navy for it. The English were good, but they let the industry die. This is another point about that—they had free trade, and they let a lot of imports in, and finally when the Germans, right before World War II, subsidized their exports to England by as much as 40 percent, they killed the industry.

Senator STENNIS. That was a deliberate plan, you think, on their part?

Mr. GREENE. I think so.

Senator STENNIS. What does this little watch sell for?

Mr. GREENE. $6.95.

Senator STENNIS. What does that one sell for?

Mr. GREENE. $3.25 and this is our deluxe, which sells for $10.95, and we have had to stop making it now, because we cannot sell it.

Senator STENNIS. This is the old dollar watch at the present day?

Mr. GREENE. That is right.

Senator COOPER. What does it sell for now?

Mr. GREENE. $3.25. It contains about 115 different parts and operations.

Senator STENNIS. That is all I have, Senator.

Senator COOPER. Have you noticed this article from the New York Times?

Mr. GREENE. No, sir.

Senator COOPER. It relates to the recommendation by the Federal Tariff Commission.

Senator STENNIS. Will you notice the date on that?

Senator COOPER. It is dated July 30.

Senator STENNIS. July 30 last year.

Mr. GREENE. It is June 30.

Senator STENNIS. It has the wrong date line here: July 30.

Senator COOPER. It calls attention to this hearing.

Senator STENNIS. The Federal Tariff Commission by 4 to 2 vote has urged President Eisenhower to increase tariffs on watches and watch movements by at least 50 percent. That is dated Washington, July 30.

Mr. GREENE. I think it refers probably to action as a result of our appearance before the Tariff Commission several months ago and they have since forwarded their recommendation to the President. This is the first we knew it was 4 to 2, or whatever it was. This information has never been made available to the American industry.

Senator STENNIS. It is in the New York Times, a special to the New York Times.

Senator COOPER. This must be yesterday's statement. Is that the request that the watch industry has made?

Mr. GREENE. No, sir. We made a request that there be a tariff increase, and also that import quotas be imposed against importations. Of course, the Tariff Commission made some recommendation to the President recently, and I presume that is their recommendation, which we have not seen.

Senator COOPER. Did you request 50 percent?

Mr. GREENE. We requested a restoration of the former rates plus an import restriction.

Senator STENNIS. On quantity, you mean?

Mr. GREENE. Yes, sir, quotas.

Senator COOPER. Mr. George Smith.

Senator STENNIS. I have no further questions. Thank you, sir.

Mr. SAMPSON. Just before Mr. Smith starts, I would like to say that in 1938, Colonel Levin H. Campbell, who later became Chief of Ordnance, as a lieutenant general, during World War II needed a manufacturer of parts for mechanical time fuses in World War II and he came to us. He was looking for somebody to make them and after looking over all industries in the United States, he picked out the clock people. He happened to choose our plant in 1938, to ask us to make parts for the mechanical time fuse because they did not have the skills and know-how at Frankford Arsenal to enable them to produce in large volume.

Senator COOPER. Thank you, gentlemen. Will you state your name and position?

TESTIMONY OF GEORGE H. SMITH, ASSISTANT SUPERINTENDENT, WESTCLOX DIVISION, GENERAL TIME CORP., LaSALLE, ILL.

Mr. SMITH. Mr. Chairman, I am George H. Smith, assistant superintendent of Westclox. My remarks have been reduced to writing, and I would like to introduce a copy for the record. In my oral testimony, I shall follow my written statement closely, although my verbal statement will undoubtedly be in greater detail.

Senator COOPER. Very well. The written statement will be entered into the record at this time.

(The statement follows:)

STATEMENT OF GEORGE H. SMITH

My name is George H. Smith. I've worked at Westclox for 25 years. I started out in our toolmaker and machinist training school, and after this I completed a watchmakers' course at Watchmakers' College. Since then I've worked in various phases of clock, watch, and fuse manufacturing and am now assistant superintendent.

I thought it best if my testimony discussed just a few points of three of the fuses we have manufactured and developed since 1939.

FUSE EX 100

The Navy Department contacted us in early 1950 with samples of this fuse and asked us to take a contract to redesign this fuse so that it would be suitable for mass production. They stated that they contacted us because the fuse was very much like a watch and figured we would be best suited to do the job. As you can readily see from the model I have here there has been some major changes; the rotor housing is now made from flat steel stock with pierced holes and the two arms are bent up instead of using solid brass that requires many milling, drilling, turning, and burring operations and much waste of material.

The movement plate was made of solid brass. We changed it to flat steel and here again all holes were pierced and four pillars are staked to the plate to do away with expensive machining operations, also material waste. These pillars of drawn steel rod are turned in the automatic screw machine. This is the same procedure as used on our wristwatches.

The annular gear on the rotor was made out of thick steel with cut teeth and held to the rotor with small springs. This is a very expensive gear to make and this method of mounting requires hand adjusting operations after which there would still be considerable trouble encountered with bad gearing. The Navy states the reason for mounting the gear in this manner was to absorb shock so that the movement gears and pinions would not break. We redesigned all the gearing and as can be seen from the sample we now have a simple blanked annular gear staked solid to the rotor and at the same time it passes the Navy Ordnance shock tests.

The escapement lever in this fuse was made in such a way that it would require a dozen operations, some of which would be very difficult. We changed this lever to the clock type and as can be readily seen it is a very simple blanked part with two pins and a shaft staked to it.

All the wheels are blanked and pierced on our clock and watch equipment. All pinions are turned and cut on our regular pinion turning and cutting equipment. Our regular checking equipment, such as, comparators, projectors, microscopes, and special micrometers are all used beside the fact that our operators are all trained in this type of work.

After the Navy approved our redesign they let contracts to 4 manufacturers; 3 of the 4 were clock or watch manufacturers, and the fourth was an instrument manufacturer. Up to the present time, we have made 1¼ million of these fuses and are now in the process of developing this fuse for other applications.

FUSE M120

During the early part of World War II, the Army Ordnance told us about the trouble they were having with the M104 fuse. This is a bomb fuse that gave very unsatisfactory results, due to the delay time being very erratic. This delay timing was accomplished by using a powder train. This powder train would be very

erratic and unreliable because of the effect humidity and temperature changes had on the powder. The Ordnance Department requested us to design a mechanical time delay. This was quite simple for our engineers and as a result we designed what is now known as the M120 fuse. The Ordnance Department after approving this design let contracts to 14 different manufacturers, most of whom were not clock manufacturers. Because of this, Westclocx was asked to help these manufacturers as much as possible. Each manufacturer sent two representatives to our plant for several days to study our methods and procedures.

FUSE M111

This is a mechanical time fuse that has an operating range of 5 to 92 seconds. We received a contract from the Ordnance Department to manufacture this fuse in 1941. This fuse was designed previously but had never been manufactured. We found in a short time that if it was made according to the prints it would not function satisfactorily, but after making several changes we knew from experience were necessary, we got the pilot lot O. K.'d and proceeded with production. I might mention here that only clock companies produced this fuse.

After we were in production for a year or so the Ordnance Department had us redesign it to make the fuse safer. This was done and the new fuse was the M146 type with an out-of-line detonator. This detonator is moved in line by the timing mechanism.

A still later development we made was to change the fuse to operate as a bomb tail fuse.

The next development contract we received on this fuse was to change the movement so that it would operate at a temperature range of plus 125° F. to minus 65° F. At the same time we redesigned the plate construction along the lines of clockmaking, and as you can see we eliminated three plates by substituting pillars. A temperature-compensation feature was added to take care of this large temperature range. Here again our watchmaking skill helped considerably because of making temperature-compensated watches.

We are now working on a still further development of this type fuse.

I have with me some of the parts of these fuses and some of our regular clock and watch parts. I am sure it can readily be seen that the equipment and know-how to make these parts would be the same.

Mr. SMITH. I would like to show you the similarity between the fuse work and clockwork in manufacturing. I thought it best in my testimony if I discussed just a few points of the fuses that we make. I will start with the EX–100.

The Navy Department contacted us in 1950 with samples of this fuse, and asked us to redesign it for mass production. They said the reason they came to us was that it was pretty much like a watch movement, and they figured we in the industry were the people best suited to do that job.

From the samples I will show you, you will see that we made some very major changes. Here is a sample. That was made out of solid brass and milled and drilled and turned on a screw machine. You can see that is an awful job to make that.

After you make it, you have to take all the burrs off it. Here is the way we made that piece out of plant stock. It is just a punch press operation, and we formed the thing up. It is just as satisfactory as the other and there is practically no material waste. That happens to be steel instead of brass, too.

Next I would like to show you another part. This is a plate. There, too, it was made out of solid brass, and you can see they milled it and drilled all those holes and there again you have a miserable burr problem. Here is the way we changed that. We have made it out of a flat piece of steel. Again it is a power-press job and the holes are all punched in.

We stake those pillars on there instead of doing the milling. Those pillars are drawn rods, turned on an automatic screw machine. That is the way we do it on our watch plates. There is quite a saving of material and it is a lot cheaper. It was satisfactory and the Navy accepted it.

Senator STENNIS. This is part of a watch here?

Mr. SMITH. Yes, sir. You can see how it parallels the fuse plate. Here is another part. You will note the gear on this part. That gear was made out of solid steel turned with the teeth milled on it, and then it is staked onto the rotor housing by three little springs. That is a miserable job. Here is the way we have redesigned it; again we have just a punched part, and we staked it on there.

The way the Navy first had it, even after the gear was mounted on three springs, you would have trouble with gearing. The reason for mounting on the three springs was because of the terrific shock. They claimed it would strip the gears. We went over the gearing and redesigned the gearing and pinions, and put that gear on there, and it still passes all the shock tests.

Here is another part of the same original fuse. It would take about 12 operations to make that part. We changed that over to the same as the pin pallets in our clocks. Here is an example. You will see there are two pins staked in there, and as a matter of fact, here is our regular watch pallet. This change increased production immeasurably. I would say we would have about one-third of the operations of that part now.

Senator STENNIS. What do you mean, operations? Taking it off one machine and putting it on another?

Mr. SMITH. Yes. Here is an example of the gears that are used. Those are the gears we have in that mechanism. Here is an example of some of the gears we have here. You can see here that this gear is made exactly the same as that. The wheels are the same. We use our same equipment. We use our same screw machines and same pinion turning and cutting machines. We use the same operators, and the same checking equipment such as microscopes, special micrometers, and so on. The important thing is that our people are trained in that work. They step right into it. As far as they are concerned, it is no different.

I would like to talk next about the M–120 fuse. Early in World War II, Army Ordnance approached us and said they were having all kinds of trouble with their 104 fuse due to erratic timing. They had a powder in the fuse for delayed timing. It seems that it would vary an awful lot due to humidity and temperature changes. They asked us to make a mechanical time delay there.

That was right up our alley. We had no trouble at all making that. Here is an example of our mechanical time delay. We made two and a half million of those during the last war.

I would like to say that since 1951 we have made a million and a quarter more of those, and we are still making it.

Now I would like to talk about the M–111 fuse. We got a contract for that early in World War II. That is a mechanical time fuse that has an operating range of from 5 to 92 seconds. It is used on flares, bombs and photoflash. When we received this contract, the fuse was designed but it was never manufactured. So we started out from the designs and in a short time we found that the fuse just would not

work the way it was laid out. After studying it carefully, we knew from experience what changes to make and went ahead and made the changes and got our pilot model made, and went into production. After we were in production, the Ordnance people came along and wanted another feature added to make the fuse safer. So we changed it over, hooked that onto the movement, and we made quite a few of those.

After that, probably due to changes in aircraft, they said that the fuse had to stand a temperature range of plus 125° to minus 65°. It had to operate in those temperature ranges. That created quite a problem, because the fuse would not work when it got down to 30° below. So we redesigned it and added a temperature compensating feature. We used the same principle that we use in our temperature compensating watches. At the same time we changed the construction of that movement from this to this. There again you can see we saved quite a bit of material. It is a little easier fuse to make, because you can get at the wheels when you assemble it. You know what you have when you have the thing together. You can check it. The other ones, you put it together, you hope that it will run. We made three and a half million of those fuses in the last war.

Senator STENNIS. Is this a time fuse you are talking about?

Mr. SMITH. Yes, sir. It operates from 5 to 92 seconds.

Senator COOPER. What do they use it on?

Mr. SMITH. Flares, photoflashes and bombs. They use it on cluster bombs, where it will open up a bomb and let out a cluster of other smaller fragmentation bombs.

I might add on this particular fuse there were only two people in the country making it, and both were clock people. We are still working on further developments of that fuse right now. Again it is because of the aircraft changes. Going to higher speeds, they want other features added. So right now we have another development contract.

I am sure you can see there the parallel between our work and fuse work. You can see that we have a definite advantage over other people in that we have the equipment, we have the checking equipment, we have the personnel. I will not say anybody else if given enough time could not make a fuse. But they would have a lot of trouble. It would take a lot of time, and they would have to get a lot of equipment. We have had a definite advantage.

That is all I have, gentlemen.

Senator COOPER. Senator Stennis?

Senator STENNIS. No, I have no other questions. Thank you.

Senator COOPER. You say again that other than the workmen in the watch industry, there is no group of workers or at least no considerable group of workers who could do this type of work?

Mr. SMITH. Yes, sir. As an example of that, occasionally our toolroom gets crowded, and we have to send out and have work done. You would be surprised the trouble we have getting decent tools made on the outside. As a matter of fact, we just pick out the easier jobs. They throw up their hands and say "We are not equipped or trained for that." We train all our toolmakers. Before we would give our own toolmakers some of these jobs, they would have to work for us 10 years in the toolroom.

Senator COOPER. You say men would have to have 10 years' training to make some of these parts?

Mr. SMITH. Yes, sir. To make the tools to make those parts.

Senator COOPER. To make the tools.

Mr. SMITH. Yes, sir.

Senator COOPER. How about to make the parts? How much training would they have to have?

Mr. SMITH. We train our people in the screw-machine department for about 3 years before they are screw-machine operators. Pinion-cutting operators would probably take the same length of time. The punch-press operators are trained in probably 6 or 8 weeks. But the supervisory help takes quite a while longer in training. Inspectors, it takes about 10 years' training before you get a decent inspector.

Senator STENNIS. Thank you.

Senator COOPER. Thank you, sir.

Mr. Dudley Ingraham.

BIOGRAPHICAL DATA—DUDLEY S. INGRAHAM

Dudley S. Ingraham, president, E. Ingraham Co., born in Bristol, Conn., 1890. Graduated from Cornell University, LL.B., 1913. Associated with the E. Ingraham Co. since 1913; vice president and treasurer, 1920–53; president, 1954.

TESTIMONY OF DUDLEY S. INGRAHAM, PRESIDENT, THE E. INGRAHAM CO., BRISTOL, CONN.

Mr. INGRAHAM. My name is Dudley S. Ingraham. I am president of the Ingraham Co. of Bristol, Conn. We make watches, clocks, and timing devices. May I submit my statement for the record?

Senator COOPER. It will be placed in the record.

(The statement follows:)

STATEMENT OF DUDLEY S. INGRAHAM

My name is Dudley S. Ingraham. I am president of the E. Ingraham Co. of Bristol, Conn., manufacturers of clocks and watches since 1831. I have been with the company since 1913; I was vice president from 1920 to 1953. I am thoroughly familiar with all phases of the domestic horological industry.

From other testimony presented to you here, you will have learned a great deal about the broad scope of the contributions to defense of the domestic horological industry. Those items which the industry produces have as common criteria small timing elements designed to measure, to start or to stop some instrument or implement of war.

Unlike some others in the industry, the E. Ingraham Co. has concentrated largely on the production of the critical timing element of the mechanical time fuse. This fuse has been called the backbone of modern ordnance and its use since its development has spread to almost every type of shell, bomb, and rocket. Despite the newest developments of the last several years, the mechanical time fuse was again a very important part of our ordnance during the Korean war.

I want to discuss very briefly the development of the mechanical time fuse and the part played in its development and production by the domestic horological industry. I shall refer to some of my own experiences because they are known to me, but I believe that many of them are common to the watch industry.

The mechanical time fuse was originally conceived prior to World War I by Gebruder Junghans, of Schramberg, Germany, reported to be the world's largest clock manufacturers. After World War I several German technicians, technical data and, I believe, some special equipment were brought to this country and located at Frankford Arsenal. There was established there a pilot organization to develop production procedures for this fuse for the use of the Army.

In the late 1930's Lt. Gen. Levin H. Campbell, now retired, then works manager at Frankford Arsenal and later to become Chief of Ordnance, realizing both the imminence of war in Europe and the inadequacy of the arsenal's capacity, began to seek assistance in the manufacture of mechanical time fuses

from industry. He went to the Eclipse machine division of Bendix Aviation which did undertake to produce the fuse. After perhaps 2 years that company was producing around 500 fuses a day—a minute fraction of our requirements in time of war. In the meantime the horological industry was also invited to join in this work.

As you know, a mechanical time fuse contains essentially a small alarm clock movement set to arm or explode the shell or missile to which it is attached. Its manufacture is very much like the manufacture of horological products—perhaps requiring a higher degree of skill in some respects because of the fantastic abuse to which it is put, yet still required to operate with amazing accuracy. For example, an artillery shell is propelled from a gun with tremendous force and travels at a high rate of speed revolving at 1,600 times per minute. Still the timing mechanism in the fuse must work with precision.

The difficulty encountered by Frankford Arsenal and others in the volume manufacture of this fuse arose to some extent out of the thickness of the plates used in their manufacture. These plates required a number of complex operations before they were completed. And in performing these many operations, it was almost impossible for the operator to hold proper tolerances—not only of the holes themselves but of the relations of the holes to each other. Obviously, the fewer operations, that is, the more that could be done in one operation, the less difficulty in their precision manufacture.

When the horological industry joined in the production of the mechanical time fuse we—and I do not mean to limit it to any one company—immediately set about to redesign the fuse to adapt it to our methods of mass production and the use of our specialized equipment because the various parts were so similar to plates, gears, and pinions used in the manufacture of timepieces. For example, we in this industry have developed techniques for stamping out gears on a press—in a single operation—whereas nonhorological companies normally make gears by cutting the individual teeth. As you can see, stamping with a die on a press will almost certainly produce parts more nearly identical and more nearly to specifications.

That this technique is somewhat unique to the horological industry is demonstrated by a letter I received as recently as December 1951 from a nonhorological company also engaged in the manufacture of mechanical time fuses.

"Tom Gibbs tells me that you are also making No. 5 gears on a press. This is something I have wanted to try for 10 years, but our tool people say you can't do it. One of these days we are going to try it anyway, although for the present we are cutting them in stacks on Fellow straight line generators."

Of prime importance was the development by Mr. Richard Whitehead, of the New Haven Clock & Watch Co., of laminated plates. Instead of working from solid pieces of stock with many operations, we learned to perform many operations on each of two or more lamina of each plate simultaneously. What this really meant was the difference between a production of a few thousand fuses a day and more than 50,000 a day.

We should remember that at this time there was considerable urgency even though the United States was not yet in the war. Neither England nor France entered the war in 1939 with a horological industry. Neither had a reservoir of skills and techniques upon which to draw for the production of timing mechanisms, particularly antiaircraft fuses which were so vitally important to them as the Nazis unleashed their then new techniques of aerial warfare.

As a matter of fact, we in the industry were visited by British delegations seeking help in the most desperate way. Therefore, our task was marked by a need for haste.

Mr. Roy T. Hurley, now chairman of the board and president of Curtiss-Wright, and who at the time was at Eclipse division of Bendix, recalled recently that the horological industry in 1 year made 365 changes in the basic German design to adapt the fuse to volume production methods. In this we were eminently successful. In addition, the redesigned fuse proved to be at least 25 percent more accurate than the one of earlier design because of the greater accuracy obtainable in our method of manufacture.

However, since we were faced with an almost limitless demand for these fuses—as well as every other conceivable article of war—the horological industry in this country could not expand its facilities nor obtain and train labor rapidly enough to permit normal methods of manufacture.

In 1944, at the height of the war, the E. Ingraham Co., then reaching peak production of critical parts of mechanical time fuses, was given apparently the highest production emergency rating for employees in the State of Connecticut, even higher than the ball-bearing and firearms industries.

General Campbell and others in responsible positions in the Army together with the industry found a deceptively simple solution. A Fuse Integrating Committee was established encompassing the entire industry. It was given governmental blessing and immunity from the antitrust laws. This committee in effect acted as a clearinghouse and board for the entire fuse program. It permitted intensive specialization within different plants in the industry.

At the E. Ingraham Co. we had established that we could reach a volume of 10,000 fuses a day. Even this was inadequate to meet the need. Instead we suggested that our plant concentrate on the production of laminated plates, stamped gears, and most of the critical timing parts. This freed us of the necessity of seeking additional labor in an already critical labor area to handle assembly work, loading and dynamic testing. With this procedure, we estimated we could reach in our plant alone about 60,000 sets of the timing mechanisms per day.

We shipped these parts for assembly to Eclipse division of Bendix Aviation, Eastman Kodak Co., National Cash Register Co., King-Seely Corp., Thomas A. Edison, Inc., Borg Products division of the George W. Borg Corp., Elgin National Watch Co., Hamilton Watch Co., Waterbury Clock Co. (now United States Time Corp.) and Frankford Arsenal.

We managed to reach a production rate of 66,000 sets of parts per day, enough together with others in the horological industry to meet the demand which in 1941 had seemed insatiable.

It is interesting to note that—as a byproduct of our methods of manufacture—we were able to save millions of pounds of copper and brass. We generated with our presswork almost wholly recoverable scrap, something impossible to attain with conventional methods used on gear work in nonhorological companies.

We at the E. Ingraham Co., had no sooner reached the rate of 66,000 sets of fuse parts a day than we were shown and asked to duplicate a German fuse which the Army had recovered intact in the field. We promised to do the job in 6 months—from designing basic prints and specifications to the making of tools and actual production—if we were permitted to devote some of our facilities, engineers, and toolmakers to this new product and thus lower our production rate on the existing program. Despite the fact that we were never able to cut back existing production, and despite the fact that we learned the captured German fuse was incapable of functioning and probably deliberately planted as a decoy, we did produce what became known as the T–48 mechanical time fuse within 6 months.

Sometime after the close of World War II, I learned, to my dismay, that records in the Defense Department listed the E. Ingraham Co., which had produced the greatest number of critical timing parts in the war, as a source of screw machine parts and presswork. No available record listed our importance to the fuse program, apparently because the integrating system we used did not permit us to become prime contractors. This experience was common in the horological industry. The records show nonhorological assembly plants—the prime contractors which made deliveries to the military—as sources of mechanical time fuses. Unfortunately, this erroneous classification plagues us to this day. Recurrent reports circulating in Washington cite the availability of nonhorological companies for the fuse program. Missing are many of the vitally important clock and watch companies.

At the outbreak of the Korean war the industry was immediately asked to undertake the renovation of stockpiled fuses for immediate use in the war. Apparently these fuses are difficult to maintain and subject to considerable deterioration. New fuse contracts were awarded and research and development programs were begun in a number of companies in the industry.

One of the first contracts for fuse production was awarded to Gibbs Manufacturing & Research Corp. Its president, Thomas B. Gibbs, had been active in the fuse program and on the Industry Fuse Integrating Committee during World War II. He conceived a rapid return to volume production through the integrating device he had helped develop before. Consequently, he arranged to have Gruen Watch Co. under his supervision assemble the parts which were subcontracted to the E. Ingraham Co. for manufacture. Again this method proved successful, and we delivered daily more than 17,000 sets of subassemblies and parts to Gruen for assembly.

Remembering our plight after World War II, however, we sought and received a prime contract from the Army for a substantial volume of fuses which we produced and delivered in addition to our subcontracting to Gibbs and Gruen.

Recently, the services have largely curtailed the fuse program and our contributions again are relegated to mobilization planning books. I sincerely hope should the need ever arise again for mechanical time fuses that the horological industry will be called. We shall try to be ready.

In conclusion, I want to stress a very significant point which often seems to be blurred in any discussion of the essentiality of the horological industry. We in the industry do not seek to hold to ourselves some magical and mystical powers not available to "nonhorologists". I shall state without equivocation that given sufficient time, equipment, money and know-how, any of hundreds of good American manufacturers with experience in precision and close tolerance work should be able to produce fuses. Unfortunately, we may not always have the time or the facilities available to start from scratch and these manufacturers undoubtedly have specialties which will be urgently needed by the Government. Thus the essence of our essentiality is in our constant state of readiness and our quick convertibility from peacetime products to wartime products.

I am attaching hereto a letter from Roy T. Hurley, which I believe typifies the attitude of those with intimate knowledge of the industry's contribution to the war effort.

CURTISS-WRIGHT CORP.,
Wood Ridge, N. J., April 14, 1954.

Mr. DUDLEY S. INGRAHAM
The E. Ingraham Co., Bristol, Conn.

DEAR MR. INGRAHAM: I am pleased to furnish you with a letter setting forth my experience with the American watch manufacturing industry in the production of the M43 mechanical time fuse.

As you know, I was responsible for the production of this fuse at the Eclipse Division of Bendix Aviation Corp. and I was also chairman of the fuse integrating committee during World War II, this being the first industry integrating committee that was formed to advance production and reduce costs. The mechanical time fuse as originally produced by Frankford Arsenal, due to the basic German design, was unsatisfactory from a production and an accuracy point of view, making it very difficult to produce the fuse in volume production. It was the horological know-how of the clock and watch industry that brought about the manufacturing redesign of the fuse using stamped gears, laminated plates, etc., making it possible to obtain the production essential for the defense of our country.

The large production of fuses at Eclipse was made possible by the production and tooling know-how of the horological industry and I doubt that the mechanical time fuse program would have been successful without the know-how and aid of this industry.

It is my firm opinion, based on my experience, that a strong watch manufacturing industry is essential to any national armament program of the future.

Sincerely yours,

ROY T. HURLEY.

Mr. INGRAHAM. Mr. Chairman, I think I will be one of your better witnesses, because I don't believe I will take over 10 minutes to present what I have in mind, and yet I hope it will be helpful to you in realizing what our industry can do in the defense effort. What I wish to do is to take one item of all these that have been shown to you and give you an indication of what the horological industry has contributed to just that one item.

I would like to select the 500 fuse series, which is the one blown up on the large board here, and of which you have had a sample in your hands, because I think it is very illustrative of the type of story which could be told to you on a number of the other items here.

I have chosen it for two reasons. First, it is considered the workhorse of our fuse arsenal. By that I mean it has been produced in tremendous volume. As a matter of fact, as recently as last December production was around 75,500 per day in the industry.

Secondly, it happens that I am quite familiar with what our industry contributed in the manufacture of this fuse. I think it is quite illustrative of the kind of story that could be told to you on any of the fuses. I think it is important to see what the industry contributed to the fuse.

May I explain a little of what that fuse is by simply saying it was originally an antiaircraft fuse, but is now being fired in guns from 75 millimeters up to 8 inches. It has a time-setting range of 3 seconds to 75 seconds, and must keep time within fifteen one-hundreds of a second, so it is distinctly a precision instrument.

It has to work when it is being fixed with a force 18,000 G, and various muzzle velocities running from 680 to 2,700 feet per second, and rotating from 2,800 to 13,000 revolutions per minute. In other words, it is distinctly a precision instrument that is keeping time under terrific conditions.

I want to point out about this particular fuse our industry contribution to it, because I think the same story is true of a lot of other fuses. I want to point out what other industries contributed to that fuse. I also want to point out, third, how important our contribution was and how important the Government considered the fuse itself.

First of all let me come up to the question of what the industry contributed to the fuse. That fuse originated in the German horological industry. It was brought over here about 1930, and taken up by Frankford Arsenal, where they started production and got out the drawings and specifications and did what they could to improve the fuse and make it producible under American methods of manufacture. Then it was given out to other industries to see what they could do to improve its quality and get into volume production. I am told by Roy Hurley, who is chairman and president of the Curtiss-Wright Corp., that he thought that the best job that was done by nonhorological companies developing and perfecting the fuse was done by the Eclipse Division of Bendix. After 2 years' time they got up to almost 500 fuses per day, and 500 they considered to be the limit of their production. That was of no real consequence. I would repeat that in December 1953 the fuse was produced at a rate of 75,000 per day. Others who were working on the fuse were unable to get up even to the production that Bendix achieved, which in 2 years was less than 500 per day.

The result was that the Government finally turned to the horological industry to see what we could do to improve the quality of the fuse, and what we could do to reduce its cost. It was a tremendously expensive fuse to produce under those methods. But most importantly, what could be done to get up volume.

I personally was called to Washington and had a meeting with a committee with General Barnes in charge, and Colonel Davis and some 18 other individuals at that meeting, and was asked what in my opinion the horological industry could do to build up the production of that fuse.

I told General Barnes that if the fuse could be redesigned by our industry, using laminated plates, which was something which had been developed by Mr. Whitehead of the New Haven Clock & Watch Co., and using our horological know-how in improving the escapement, using blank wheels, subdied gears, and drawn pinions, and making various changes in escapement, I believed we could get up to very substantial production.

We were asked if we would take a contract for a rate of 10,000 per day, as a prime contract. I said that is all we could possibly produce, 10,000 per day, because of the critical labor shortage in Connecticut. But if the Government would set up other fuse assembly plants in other parts of the country and allow us to make all these critical parts for the timing mechanism, we could make enough for 50,000 per day.

Apparently that impressed the general sufficiently so that as a matter of interest, the train taking me back to New York was held up at Philadelphia, and all the samples were turned over to me. We started to work at once. We delivered parts for inspection to Frankford Arsenal before the Government got the paperwork through for an order. So we got into it very, very fast.

Factually we got up to 66,000 parts per day of all these critical parts going into the fuse and those parts were furnished by us to the concerns who assembled them and were set up for that purpose, such as the National Cash Register Co., Eastman Kodak, Thomas A. Edison Co. Frankford Arsenal themselves got their parts from us. And that made it possible to get the volume of production that the Government was after.

As a matter of interest, in the very recent past we have been furnishing the same parts to Gruen. And we have furnished them in the last 3 years over 400 million sets of parts, largely assembled, which constituted the timing mechanisms for the fuses.

Now, I would like to point out the contributions of the horological industry to the fuse. Let me say first of all that while the laminated plate idea originated in New Haven Clock & Watch Co.—and perhaps we are the ones who were responsible also for changing from cut wheels to subdied wheels and shaved gears and items of that nature and improving the escapement, the escape lever and the grinding thereof and all of these special parts—I believe that if the same fuse problem had been put to any one else in the horological industry, they would have come up with the same answer.

It just happens that it was first put up to New Haven Clock & Watch Co. and ourselves so that we were the ones who reached those answers. But I believe that either the jeweled-watch industry or the nonjeweled-watch industry would have come up with the same answer. Now, what resulted? As I stated, the largest production up to that time, outside of Frankford Arsenal, was 500 fuses a day. We got production up to 66,000 per day. And that huge production was tremendously important. Secondly—and I think of very great importance—it improved the quality of the fuse to the extent that the firing of the fuse was 25 percent more accurate than the fuses made the old way.

Now, I can explain in detail why the accuracy increased.

For example, we were able to hold the size of the holes in the plates to within plus or minus a quarter of a thousandth of an inch. We held the gears so accurately, the pinions so accurately, the sizes so accurately, that the tolerance between the center of the hole and the outside diameter of the wheel and the escape wheel was only four ten-thousandths of an inch. Now, that accuracy together with our manufacturing this tremendous volume is what went a long way in improving the timekeeping of the fuse. We also made tremendous savings, millions of pounds, in copper and brass, which were very critical. We cut the cost of the fuse very substantially, which, of

course, per se meant a substantial saving in labor. And labor was very critical. We did it with very little Government investment, because we had the know-how; we had the facilities; we used the equipment already in the horological industry. And that meant a great saving to the Government in that respect.

Now, let me ask you, what did other industries contribute? I think I have answered that in part by indicating that they could not get volume production; they did not redesign the fuse and that it was put in the hands of the horological industry for redesigning. But I think there is another angle to that that you would be very much interested in investigating, and which you gentlemen can investigate and which I cannot. But I think it would be very interesting if you would find out who has been requested since Korea or before Korea to submit bids on this fuse.

The specifications and details have been given to a lot of other industries outside the horological industry. And I think it would be very interesting to see how many of them bid on the specifications. Nonhorological companies found the specifications, frankly, much too difficult to meet. They did not know how to meet them. And I know whereof I speak, because we have had a good many important companies come to us and ask us to furnish them the plates and the gears and the pinions, because they wanted to bid on the fuse. But when we told them that our capacity was absorbed, they did not put in a bid.

And I think that is a pretty revealing indication as to whether these fuses can be made in other industries.

Third, I would like to point out how important our contribution was and how important the fuse itself was. In regard to the importance of the contribution, I think it is interesting to comment that the very day that President Roosevelt made Gen. Levin Campbell Chief of Ordnance he flew to Bristol, Conn., to discuss this fuse with us, to find out and see for himself how it had been possible to achieve this tremendous production, and to see what suggestions we could make toward certain other problems on time fuses in nonhorological companies where he was trying to get greater production. They did not succeed in producing in volume. We made a lot of suggestions to the general, which I think were of a good deal of help to him. As a matter of fact, we take considerable pleasure in one particular suggestion which I will mention. That is we told him that we thought one of the best ways to improve the war products and to improve production and production volume was to set up a committee, to meet once a month, of the leading engineers of each concern in the horological industry. The first integrating committee in America was the Fuse Integrating Committee, of which Roy T. Hurley was chairman. Subsequently similar committees were set up in other industries.

Now, I think there is another indication of the importance of the fuse. That is in the labor urgency rating that we had.

I think you all know that there was a tremendous shortage of labor, and that we were only allowed to hire only such labor as Washington gave us permission to hire. You might be very much surprised if you were to look into the records and find that—for example in the year 1944—the labor urgency rating of the horological industry in Connecticut was above the firearms industry, above the airplane industry, above the motor industry, above the ball-bearing industry.

Actually, at times we had the highest labor urgency rating of any industry in the State of Connecticut. That shows how urgently the fuse was needed.

I think that gives you a pretty good indication of what our industry contributed to one fuse. But I do not want to conclude this without suggesting that since you are studying the importance of this industry in case of war, an investigation ought to be made as to where these products are made in other countries. In other words, where do the other countries go to get mechanical time fuses? I think if you will make such an investigation you will find that they all went to the same industry—the horological industry.

It has already been pointed out by Mr. Greene that NATO has set up a source of supply of these fuses abroad; and it would be very interesting to find out where NATO went. They went entirely to the horological industry. I do not believe that any of these are being made outside of the industry abroad.

Now, I want to make one thing clear: That is that none of us maintain that these fuses, these items, could not be made—nor do we maintain that clocks and watches could not be produced—in other industries if they are given time and money and equipment and know-how. But a lot of the equipment that we use we ourselves built. A lot of the equipment that we use we drew up the designs and specifications for, and they are not available on the market. They are specialized equipment used in the horological industry. Now, we have all of that equipment, and we have the know-how also; and we can save a tremendous amount of time getting into any of these production items.

I would just like to comment that I am going to make a comparison that I think is perfectly pertinent. I submit to you gentlemen that I could prepare a bill to be introduced in Congress on any subject; I submit to you, further, that it would probably be full of errors, and it would take me anywhere from five times to a hundred times as long as it would take an experienced attorney or one of you gentlemen to prepare that bill. I do not think there is any difference in that situation from our industry's position on production of timing devices. We can put out these items with much less possibility of errors, with much greater accuracy, and also secure greater volume and save time, all of which are important elements in the modern type of warfare.

I am going to summarize very briefly that I think that we need a horological industry not only because we need clocks and watches but also because we do need a knowledge of timekeeping, to engineer and solve problems similar to this one which are bound to come up for horological solution in another war. America cannot afford to lose the know-how, the specialized equipment, the skills or the organization of a going horological industry.

Senator COOPER. Thank you, Mr. Ingraham.

(Discussion off the record.)

Senator COOPER. We will adjourn to the District of Columbia room, room P–38, which is right off the Senate floor, in order that the members may be available to answer calls to the floor. We will try to finish there if we can.

(Whereupon the hearing adjourned to room P–38 of the Capitol Building.)

Senator COOPER. The meeting will come to order.

I think Mr. Carmody was to be heard.

TESTIMONY OF E. T. CARMODY, SECRETARY AND COUNSEL OF THE UNITED STATES TIME CORP., WATERBURY, CONN.

Mr. CARMODY. Thank you. The hour is late and I will be brief. My name is E. T. Carmody. I am counsel for The United States Time Corp. and also secretary of the company. We are the makers of Ingersoll watches, Timex watches, and Waterbury clocks, with plants in Connecticut, Arkansas, and Texas.

Senator COOPER. Where is your main office?

Mr. CARMODY. The main plant is in Middlebury, Conn.

You have heard in the last day and today the best horological brains in the world. I am not a technical man, and I will not attempt to go into technical problems. If there are any points that have to be made on that side or any questions to be asked, Mr. Patterson, director of production at United States Time, will be glad to answer them.

I set out to find out for myself, being nontechnical and having only a very slight knowledge of that side of the business, to learn what it was that made this industry tick, and made it unique, indispensable and irreplaceable, and I did it by asking questions. I arrived at certain conclusions which may be of certain interest to this investigating body.

I found out that in the industry the art and skills are divided into two parts, mechanical and managerial. There are five large groups in the mechanical subdivision, and they are the tool designers, the tool and die makers, the tool setters, the inspection people, who are very important. They make their own gages and set up their own standards of inspection, which are all peculiar to this industry.

Then the repairmen, which is another specialized group who can look at a watch or a fuse and by examining it analyze its problems and its troubles, and tell where it fails or what needs to be done about it. That is the mechanical group.

In this group are all the great skills you have been hearing about for the last day or two.

The other part of the team is the managerial group which consists of the engineering people, the quality control people, process and methods engineers, the production control people, the foremen, the procurement people, including their troubleshooters, the group that trains learners, and the research and development group.

That, gentlemen, is what composes the entire team. There is not one segment of either branch that can be dropped out or that can be anything but top rate if we are to have an integration of this particular process, and this particular art.

Senator Cooper asked repeatedly during this hearing a very searching question, namely, if the men possessing these skills leave this industry and go elsewhere, can they later be recaptured and brought back to the company they left and the company revived, resuscitated or returned to this sort of work, in case it has been dispersed.

The answer is very definitely "no," that the skills can themselves be lost in a short period of time, and even if the skills are retained by the people elsewhere, in the first place the people will not come back, because they will have established seniority elsewhere, and in the second place, there will be no team, I think a better word is "orchestra" to return to.

If any one of these 9 sections under the managerial group, or any of these 5 sections under the mechanical group, all with numerous subsections, are themselves lost or dissipated, strayed, or stolen, you cannot put this orchestra together in anything less than a long period of years. When this group works together under a conductor or leader, which would be the president of the company, it produces watches in peacetime of which there are 78 parts with 45 or 58 moving parts. In wartime it produces fuses which have 140 parts, about 55 of them moving parts.

To start from scratch with the designing board, and arrive finally with all the parts and begin to put them together, and to have the moving parts move synchronously and keep time, that itself is the mysterious art or skill that requires this tremendous orchestration.

I think it is of significance that this industry does not claim to deal with the finest tolerances that there are in industry. It deals with very close and exact tolerances, but not as high as the ballbearing industry. But the ballbearing is a static, nonmoving thing in relation to other parts. It is a cushion or a basis of frictionless movement. But it is not a part of an instrument like a watch. The tolerances that are used are very close and very difficult.

I had a statement from one of the engineers in this industry that enlightened me more than anything else on the why of this question. You have heard the what for several days. What we have done, what we can do. But it was the why I was after.

The very good statement I got from him was this: "It is very fussy work, but we are not scared of it." It is fussy work, you have heard that. We are not scared of it. There is no other industry that is not scared of it. The timing devices are unique, difficult and fussy. When you have an orchestra like this working together, it is able, as we, for instance, were able, to produce $184 million worth of defense items, of this high tolerance, high precision; 29,000 fuses a day. Whereas a great company like Bendix, with its enormous skills and its great resources, was able only to get up to about 500 fuses a day. That is because they did not have the orchestration. They have great skills, but not the orchestration for this particular job.

Now I came down to the question, just what is the job? What are the elements that compose the uniqueness and the indispensability and irreplaceability of this industry? I was getting near the end of my search. I came up with four points. This is more or less a synthesis. It is not brandnew. I think it focuses on the why of this industry. I wrote them down as follows:

No. 1 is the ability—I am speaking now of war work, particularly—to design, to redesign, to simplify and to save material. That is when a job is brought to this industry for solution at a time of national emergency.

No. 2 is the ability to work with exacting tolerances.

No. 3 is the possession and the knowledge of how to use high-precision machinery.

The fourth and last is the ability to get into production rapidly, into production which is continuous and in large volume. In other words, to hold these tolerances hour after week after month while untold tens of thousands of these items are sent forth to the armed services. This orchestration has never been achieved by any other industry, and it cannot be achieved by any other industry. They

are great in their own lines, but when it comes to the timing devices, they call on us for help at every turn. They require our know-how and they require our timing devices mostly in whole when they do try to get into our line of work.

I think, gentlemen, that about covers the points I wanted to make. It was the result of my own unknowledgeable search for the why of the industry. I thank you very much.

I would like to present this statement of this company for the record, Senator Cooper, if I may.

Senator COOPER. The statement will be inserted in the record.

(The statement follows:)

STATEMENT OF THE UNITED STATES TIME CORP.

There are probably a good many companies in this country which would, if given enough time, money, equipment, and skilled manpower, make a mechanical time fuse. They could, or at least some of them could, probably turn out two or three hundred of these fuses per month when they had learned how to do it. There is good evidence that the time required would be several years. The point of this is that the absolutely unique and irreplaceable contribution of the American horological industry to the national security is the ability to get into production of fuses and other precision instruments of war requiring horological skills fast and then to achieve volume production fast and then to keep that production going around the clock month after month. (Exhibit A and exhibit B hereto attached will show the great volume that can be achieved by one company alone.) The purpose of this statement is to explain the whys and wherefore of this state of facts to you.

There is a hard core of skilled people required for the normal peacetime job of making watches, clocks, and other timing mechanisms. The skills are not all strictly mechanical skills, as the production of a watch requires above all teamwork. The skills of those of the team who have over many years acquired knowledge and know-how in procurement, in methods of engineering, in the training of learners and in the general management of such an operation as this, are hardly less indispensable than the actual mechanical skills themselves.

A list of the job classifications for watch and clock occupations which was compiled in 1952 at the request of Horological Section, Scientific and Technical Equipment Division, National Production Authority, is attached hereto as exhibit C.

A production team of this kind evolves. It cannot be hired in the marketplace as a group nor can such a team be assembled by picking one of its members here and another there. The team evolves and gradually over the years achieves a harmony in working together in this difficult field so that it is propably no exaggeration to say it resembles a good orchestra playing together. If any other company by choice or directive decides to become an assembler or producer of fuses, it will reach the point, no matter how high or excellent its own skills, where it must turn to this team for component parts, subassemblies, and particularly timing assemblies if it is to live up to its delivery schedule with the Government.

The American horological industry, besides supplying the armed services with 25 million military items during World War II, was able to supply other companies outside the industry with 3½ billion of such component parts.

The industry has machinery and equipment, a good deal of it designed and made by its own people, which can, for instance, produce pins of which 600,000 are required to fill a 1-ounce glass. The science, if not the art, is to hold a part within a tolerance of five one-hundred-thousandths of an inch, month after month. In the first place, the toolmaker who makes the tool which produces the part is a diemaker. It has been over the years a frequent occurrence that members of this industry have taken on good toolmakers from other companies without the industry. It has taken, still takes, and will, beyond any doubt in our minds, continue to take another 4 to 7 years before that toolmaker can make some of the horological dies required in the production of watches.

An interesting sidelight to these skills is the fact that this industry does not claim to deal in the most minute tolerances known in the industrial world. The manufacturers of bearings frequently deal in smaller tolerances than this industry does and this may be a clue to the uniqueness we are trying to describe. A watch and a fuse are composed of well over 100 parts, many of them moving parts, and it is in the seemingly infinite variety of times and places that the correct meshing of all the component parts of a watch or fuse movement may go wrong that there is called into play the industry's unique know-how. Some of the plates of the watch movements produced by the industry are merely pieces of metal in which holes are pierced. Yet, to turn out these plates with the holes properly placed and pierced is a skill which has baffled some of the ablest producers in American industry. Such examples may be multiplied many times.

Since a fuse is in essence a watch movement which must operate after being expelled from a gun at extremely high velocity and subjected to approximately 16,000 revolutions per minute, there is obviously no other group which can turn to and succeed in producing fuses within any reasonable time except the horological industry. Prior to 1912, all fuses were powder train fuses. The length of the train of powder which was fired by igniting it determined the moment at which the shell would explode. It was the horological industry in Germany which in that year developed the mechanical time fuse. It was the horological industry in America which redesigned, perfected, and put the redesigned item into mass production for the armed services of this country. It is the same industry which in World War II and the Korean war was the only source for these indispensable items in volume.

The need for these skills increases as modern ordnance becomes more complicated. It is obvious that guided and controlled missiles, for instance, require timing devices to perform their function. We will continue to be the only volume source for them.

Because of the nature of our operation, we will be already half way in production when and if the call comes again.

We remember the British colonels and generals of ordnance when at the outbreak of World War II they had suddenly found that their native horological industry had been all but destroyed by foreign competition. We hope that the American military will never find themselves faced with this grim reality.

EXHIBIT A

World War II production

	Quantity	Value
Fuses:		
Artillery	5,883,265	$41,504,250
Bomb	2,460,335	13,454,133
Total fuses	8,343,600	54,958,383
Aircraft instruments:		
Turn and bank indicators	162,857	6,200,251
Oil pressure gages	105,863	4,037,270
Screw jacks, actuators, hook retractors, shutter controls	121,549	6,045,747
Total aircraft instruments		16,283,268
Gyroscope units:		
Fire control (B29, P61, etc.)	31,120	7,087,347
Antiaircraft gunsights	141,800	17,965,649
Spare parts		5,558,786
Total gyroscope units		30,611,782
Other:		
Averaging units for sextants	28,862	1,482,363
Depth gears	928	496,480
Torpedo gyroscopes	150	236,732
Miscellaneous		4,093,353
Total other		6,308,928
Grand total		108,162,361

EXHIBIT B

Korean War and post-Korean defense production during the defense emergency, 1951 through May 31, 1954

	Quantity	Value
Fuses:		
Mechanical time	9,505,542	$68,065,020
Other	810,814	4,004,772
Total fuses	10,316,356	72,069,792
Aircraft instruments:		
Flight directors	1,430	1,143,187
Flight director, parts		266,419
V-3 indicators	7,852	1,147,272
V-3 indicator, parts		90,091
Rate gyroscopes	938	507,282
Other aircraft instruments	403	144,558
Total instruments		3,298,809
Other:		
Sterilizer	14,300	72,460
Research and development		483,135
Total other		555,595
Grand total		75,924,196

EXHIBIT C

EXAMPLES OF HOROLOGICAL SPECIALISTS AND THEIR NECESSARY PARTICIPATION IN THE DEFENSE EFFORT

In order to illustrate the need for horological specialists in the defense effort, three examples are briefly cited as follows:

EXAMPLE NO. 1

The horological tool and die maker personifies a highly trained person who is educated for work on watches and clocks but who can do similar work related to plates for the mechanical time fuse and other difficult tasks with equal skill.

His work entails working to exacting tolerances to produce minute parts. The job classification of this specialist is as follows:

Tool and die maker (horological) (8 to 10 years' experience required)

A tool and die maker must possess a vast working knowledge of machines, machine capability and utilization, material characteristics, heat treat, and complex measuring devices.

A tool and die maker builds tools which perform a series of operations while running in one machine. He works from the tool drawings for preference purposes only. All pertinent information is accumulated from piece part and assembly drawings. The tools must be constructed so that each operation performed will be in correct relationship to all other operations. The work must be laid out so that no adverse tolerances or accumulation of tolerances exist. The sequences of piercings, lancings, guttings, and formings must be laid out in such a manner as to insure enough material strength in the piece to support succeeding operations. The number of pilot points as well as the material travel distance between stations must be determined and built into the tool.

A comparison between the function of the plates in a mechanical time fuse and the function of the frames of a watch clearly indicates the close alliance of tool and die making required for fuse plate manufacturing and tool and die making required for watch frame manufacturing.

Watch frames and fuse plates are identical as to relative hole diameters, piercings, formings, and tolerances. The plates in the mechanical time fuse have the same function as the frames in a watch, namely, to provide pivot points for gears and pinions.

Therefore, the skill necessary to manufacture watch frames encompasses the the skill required to manufacture fuse plates.

EXAMPLE NO. 2

The closely knit alliance that exists between the horological field and the skills peculiar to the field of instruments and mechanical time fuses is shown in this category of chief draftsman (horological):

Chief draftsman (horological) (10 years' experience required)

A chief draftsman supervises directly the activities of all horological draftsmen in his charge; he is essentially a mechanical draftsman but is highly specialized in timekeeping and mechanical time-control mechanisms; he is responsible for the preparation of clear, complete, and precise working plans and detailed drawings from rough or detailed sketches or notes, for engineering or manufacturing purposes according to the specified dimensions; he must be thoroughly familiar, with wheel and pinion ratios and specialized tooth forms common to the horological industry.

He must also be familiar with the many types of oscillatory system for mechanical time controls; he must be thoroughly conversant with manufacturing tolerance controls as they pertain to the horological field.

A chief draftsman must be thoroughly familiar with manufacturing processes in order that all components may be so designed that they may be mass-produced economically and be interchangeable at assembly; his academic background must permit him to cope with problems in higher mathematics.

As pointed out above, a chief draftsman (horological) must be thoroughly familiar with gear and pinion ratios and specialized tooth forms as a very important and integral part of his duties. This knowledge can be transferred directly to the laying out or redesign of gear trains in either fuses or instruments.

The same facts would hold true for the oscillatory systems of watches or fuses. This oscillatory system is the method used in checking the timekeeping characteristics of a horological device, including watches or clocks, time fuses and timekeeping instruments.

EXAMPLE NO. 3

The flexibility of highly skilled personnel in the horological field is illustrated in the following instance:

Process and methods engineer (horological) (10 years' experience required)

Process and methods engineer must be able to read complicated blueprints with a thorough understanding of the final end product and must be able to resolve these observations into a sequence of manufacturing operations, including making the selection of proper machine tools to mass-produce complicated precision parts and assemblies in the horological industry; he must be completely familiar with all types of machining and tooling characteristics in order to determine method or methods by which intricate precision parts are made; he must also be capable of improving production and quality through economical methods changes, taking into account the cost of the end item.

The above description relates to the horological field. However, there are very similar duties in manufacture of mechanical time fuses.

In the manufacture of a mechanical time fuse, the sequence of parts manufactured, parts assemblies, their functions and nomenclatures are related to watch and clock manufacture.

Therefore, the horological process and methods engineer is already conversant with the intricacies and problems which exist in mechanical time fuse mass production.

The training this engineer has received also qualifies him to work on precision instruments and gyroscopes.

We have given three illustrations showing the type of work that highly skilled men perform in connection with mechanical time fuses as well as the horological industry.

The regular factory worker is important in production of mechanical time fuses because speedy mass precision production is of primary importance after a contract is placed.

Director of quality control (10 years' experience required)

Director of quality control reports directly to top management individual and must assume complete responsibility for quality of raw materials, purchased parts, work in process and finished products.

He must organize and supervise the quality control department which includes chief inspectors, general foreman, quality control engineers, tool and gage inspectors, patrol inspectors, and final inspectors.

He is responsible for all tool and gage inspection and for estimating cost, designing, procuring, and maintaining all the measuring and gaging equipment.

A director of quality control in the horological industry must be capable of establishing inspection methods and tables to govern the percentage inspection of extremely small and precise, close tolerance piece parts and components manufactured in large quantities and interchangeable at assembly. He must also instruct subordinates in the use of established methods having to do with large-scale production inspection and involving the use of specified gages, layouts, and intricate measuring devices, mechanical and electronic.

He must be a graduate mechanical engineer schooled in statistical control techniques and principles of gaging, measuring and charting.

Diemaker—maintenance specialist (10 years' experience required)

A diemaker maintenance specialist must be capable of laying out, building and maintaining completed dies which are capable of producing precision piece parts on a mass-production basis.

He must be able to lay out, working with or without blueprints or sketches, build and maintain intricate subpress, cut and draw, form dies, subassembly and assembly tools, gages, cutters and fixtures.

He must also be capable of laying out, building and maintaining complicated secondary tools used to pierce small holes and cut irregular shapes in precision piece parts on a mass-production basis.

Pinion and wheel-cutting setup man (3 to 5 years' experience required)

A pinion and wheel-cutting setup man must have a thorough knowledge of the function of the equipment which he services.

He must be able to set up, adjust, and maintain all tooling relative to pinion and wheel cutting. He must be thoroughly familiar with the use of various gages and related gaging equipment used to check sample lots of watch parts after the installation of tools on this equipment. He is responsible for the quality and amount of precision watch parts mass-produced on these machines.

He must instruct new operators in performance of duties. He must read blueprints and be capable through the selection of proper back off tools to manufacture from blanks supplied him the correct pinion cutters to enable the production of the required pinion and gear tooth forms.

General foremen (5 to 8 years' experience)

A general foreman supervises directly or through subordinate foremen all production in his various departments, coordinating the work of the various departments, regulating production, overseeing the hiring, discharging, transferring and promoting of employees, and performing other administrative advisory duties to insure proficient, profitable operation.

It is required that a general foreman have a good academic background.

He must be capable of supervising the precision manufacturing, inspection, and assembly operations found only in the horological field through experience gained in lower-level supervisory positions in this industry.

General foremen in the horological industry are assigned to the following divisions:

(1) Piece part fabrication
(2) Secondary and subassembly operations
(3) Piece part inspection
(4) Movement assembly
(5) Final assembly
(6) Final inspection and testing
(7) Watch tool and die making production and maintenance
(8) Inspection of watch tools, dies and gages.

Foreman, rolling, tumbling, polishing (8 to 10 years' experience required)

A foreman must be capable of performing specialized and standard rolling, tumbling and polishing operations on small mass-produced precision parts in order to produce quality standards of finish without damage or excessive losses. He must be capable of recommending the proper selection of solutions, abrasives, barrel types and sizes to be used and the process time involved to achieve desired piece part finish.

Pinion master form and cutter maker (6 to 8 years' experience required)

A pinion master form and cutter maker must be a highly skilled tool and die maker. He must be familiar with the cutter characteristics of all types of tool steel, brass, copper, aluminum and all materials that go in the manufacture of timekeeping devices common to the horological field.

He must be familiar with all types of cutters necessary to machine intricate parts on mass-production basis for watch parts.

He must have a thorough knowledge of feeds and speeds on all production grinding and cutting equipment.

He is responsible for the making of the master forms which control the contour of the finished pinion or wheel. He is responsible for the maintaining of very rigid manufacturing tolerances on these intricate mass-produced watch parts.

Spring manufacture setup man (5 years' experience required)

A spring manufacture setup man must be able to operate and maintain all types of hardening and tempering furnaces; also scale removing, polishing, edging, and cleaning machinery relative to the horological industry. He must have a mechanical ability to set tools and repair breakdowns. He must be able to read gages relative to type of equipment he runs and have a knowledge of blue prints and inspection gages. He is responsible for all work fabricated in his department. He must also have supervisory ability.

Design engineer (8 to 10 years' experience required)

A design engineer must be highly skilled in the mathematical and physical sciences. He must be capable of resolving specifications, data and known mechanical and electrical functional principles and be able to resolve them into product sketches or drawings from which working models of intricate precision mechanisms can be constructed on a mass-production basis.

Coordinate measurement machine technician (6 to 8 years' experience required)

A coordinate measurement machine technician must be a highly skilled tool and die maker. He must be able to compute and analyze the findings obtained from the use of an intricate measuring machine capable of checking tolerances up to one-hundred-thousandths of an inch in relation to the dimensional checking of tools, jigs, fixtures and gages used in mass production of intricate watch parts.

He must be able to set up and measure to these tolerances any production gage or tool used in the horological field.

He must be well versed in higher mathematics. He is responsible for highly valuable and sensitive equipment.

Watch repairman (6 to 8 years' experience required)

A watch repairman must have a complete knowledge of the function of all types of watches and clocks. He must be able through inspection and various types of tests to ascertain the type of defect and the type of repair or replacement of parts necessary.

He must be able to completely dismantle any type of timepiece with watch repairman equipment, make any necessary repair or adjustment, rebuild the movement to function properly. He must be able to run timepieces through all types of mechanic and electromechanic testing or regulating equipment peculiar only to the horological industry. He must be completely responsible for the appearance and performance of these repaired timepieces.

Screw machine setup man (6 to 8 years' experience required)

A screw machine setup man must make complicated and special tooling setups on Swiss and turret-type automatic screw machines. He selects proper cams, feeds and speeds to mass-produce small complicated parts to close tolerances maintaining surface finishes on all machine surfaces to close microinch measurements as determined by brush surface analysis or similar instruments.

Inspector—die, tool, gage (5 years' experience required)

An inspector must have a wide mechanical training including being a first-class tool and diemaker. He must make complete detailed inspection of complicated dies, tools and gages. Measurements must be made to very close tolerances which require the use and complete familiarity of a wide range of measuring devices; such as Hauser, Bauch and Lomb projectors and other scientific measuring instruments. He must be able to read complicated blueprints, make mathematical calculations and indicate errors and flaws in the items inspected.

Chief tool engineer (12 years' experience required)

A chief tool engineer must process, approve and requisition all new watch tools and be responsible for the maintenance of these watch tools in production. He is responsible for the availability of new tools and standby tools as required.

He decides the merits of submitted designs, conferring with the designers on suggested alternate designs or modifications thereof. He must also be responsible for the coordination of all phases of work carried on by his staff.

A chief tool engineer must have had long experience in other levels of this profession, e. g., drafting, designing, etc., on small precision tools used only in the horological field.

This position requires sound educational background in mechanical engineering, tool and diemaking and/or tool and die designing.

Chief methods engineer (5 to 7 years' experience required)

A chief methods engineer must be able to actively direct and supervise the efforts of men in his department to reflect a direct saving in the end cost of the watch manufactured through improved job methods, proficient and adequate tooling and elimination of unnecessary or uneconomical operations.

He must be completely familiar with all types of machining and tooling characteristics in order to determine method or methods by which intricate precision watch parts are made at minimum cost and to highest attainable quality level.

A chief methods engineer must have a suitable academic background to cope with the engineering and mathematical problems common to this position. He should have practical shop experience in lower related fields, e. g., time study, junior engineering, etc., in the field of horology.

Senator COOPER. Several witnesses have testified that men are being laid off now in these plants. Where are they going?

Mr. CARMODY. In our area, they are going into the brass foundries, into the screw machine shops, into the cutting-up and fabricating shops that are up and down our valley when there is work available. That is where they are going. If they are in the higher skills, they are being taken up most avidly. If they are in the toolmaking group or die-setters group, they are taken up most avidly.

Senator COOPER. Does your company have contracts with the Government for the making of fuses?

Mr. CARMODY. They were all canceled by telegram last week. Our whole industry had its fuse program stopped by telegram, to be closed as of the 30th of June.

Senator COOPER. You mean all of this particular branch of the watch and clock-making industry?

Mr. CARMODY. We laid off 1,100 employees practically immediately and The E. Ingraham Co. laid off 800 almost immediately.

Senator COOPER. I will ask somebody in the jeweled watch industry. Are you making these devices?

Mr. BULOVA. Yes.

Senator COOPER. Has there been a cutback?

Mr. BULOVA. Just on this one fuse there was a cutback, but we are making many others.

Mr. TYDINGS. In some of the other jeweled bearing plants there are cancellations of big orders.

Senator COOPER. Do you want to make a statement of what is happening in your branch of the industry?

Mr. BULOVA. In our branch of the industry we have been working on proximity fuses, as well as the mechanical time fuses. As I understand it directly from Ordnance, that whereas they were making three mechanical fuses to 2 proximity fuses, they are converting it over to making 3 proximity fuses to 2 time fuses. In that conversion, they have cancelled out this 1 mechanical fuse, this 500 series. We are on

four other types of fuses, plus the other mechanical devices that we are doing for guided missiles.

Mr. GREENE. Senator Cooper, may I interrupt for the record? Our company was cut back on one fuse, but on another fuse there has been no cut back. We are producing that still in very large quantities.

Senator COOPER. I suppose that ends the testimony of the industry. Are there any others here who want to amplify the testimony?

Mr. MICKEY. My name is Paul Mickey. I am counsel for Elgin and also for Hamilton Watch Co.

Elgin has had no cancellations of fuse work. They are doing work entirely for the Navy. None of their fuse work has been canceled. Hamilton had one fuse contract which involved the same fuse that Mr. Carmody referred to canceled. But it is still making the rear fitting device for the Navy.

Senator COOPER. I notice in reading the testimony of Mr. Ingraham, the statement that for some reason your branch of the industry was not listed by the Defense Department as being fuse makers, is that correct?

Mr. INGRAHAM. That is correct. We were shown the listing shortly after the Korean war began. We had only been subcontractors in World War II. We felt if we went in as prime contractors, we would limit our production for time fuses to 10,000 a day, but as subcontractors with others doing the assembly work, we could get up to 50,000 a day, and we thought that was the greatest contribution to the Government. Not being prime contractors, we were listed as a satisfactory source of supply for screw-machine products and press work, which work almost any concern can furnish.

Senator COOPER. May I ask, are your connections with the Defense Department with the Ordnance Departments?

Mr. CARMODY. Yes.

Senator COOPER. Is that true with respect to all the companies?

Mr. CARMODY. Usually with the ordnance district that is nearest our plants, and Naval Ordnance, too.

Senator COOPER. I think that is all.

Senator Tydings, do you want to be heard today or tomorrow morning?

Mr. TYDINGS. Tomorrow morning will be fine. As I am the only witness for what might be called the opposition, I am hoping that both Senator Duff and Senator Stennis can be present, because they have heard the other side. I would like to say we are in partial agreement with the other side on many phases of this controversy.

Senator COOPER. I think you are right. They should be present. I can say that for myself, too.

Since Senator Duff is chairman of the committee, I will have to let him fix the time. Counsel says that Senator Duff will be ready at 11:30 in the morning, so the meeting will be held at 11:30 in the Armed Services Committee room.

Mr. TYDINGS. I hope Senator Stennis can be there, too, tomorrow.

(Thereupon at 5:03 p. m., the hearing was recessed until Friday, July 2, 1954, at 11:30 a. m.)

ESSENTIALITY TO THE NATIONAL DEFENSE OF THE DOMESTIC HOROLOGICAL INDUSTRY

FRIDAY, JULY 2, 1954

PREPAREDNESS SUBCOMMITTEE NO. 6,
SENATE ARMED SERVICES COMMITTEE,
UNITED STATES SENATE,
Washington, D. C.

The subcommittee met, pursuant to recess, at 11:30 a.m., in room 212, Senate Office Building, Senator James H. Duff, chairman of the subcommittee, presiding.

Present: Senators Duff, Cooper, and Stennis.

Senator DUFF. The committee will come to order.

You may proceed, Senator Tydings.

STATEMENT AND TESTIMONY OF HON. MILLARD E. TYDINGS, COUNSEL FOR THE AMERICAN WATCH ASSOCIATION, INC., NEW YORK, N. Y.

Mr. TYDINGS. Mr. Chairman and gentlemen of the committee, my own experience on the Senate Armed Services Committee of 24 years indicates to me the importance of this inquiry. What I shall adduce here today I hope will be facts which are supported by documentary evidence rather than my mere opinion.

Ever since I left the Senate in January 1951, I have been representing the American Watch Association, which, among its members, includes Gruen with a plant in Cincinnati, Bulova, Benrus, Longines-Wittnauer and so on. In some of these matters the Bulova Watch Co. has been neutral, and, therefore, I don't today, in representing the American Watch Association, speak for that company. I do speak for the other members of that organization.

I have made several trips to Switzerland to gain a fuller knowledge of the watch industry so that I could perform legal services that might have some merit where the watch industry was in controversy in this country. I have already told you the principal members of the American Watch Association, and there are many others, some 50 or 60 all told.

Now we are here today to discuss the essentiality of the domestic watch industry, and, as I understand it, three companies, Elgin, Hamilton, and Waltham, with Bulova on national defense, have been petitioners here and have offered testimony before this committee. I am speaking for the other members of the American Watch Association, and rather than have these various members appear and offer repetitious testimony I am speaking for those that I name and those that I didn't name.

The American Watch Association is completely American-owned, completely financed by American capital, and completely employing American citizens. I think the employment rolls of the organization I speak for will stack up very favorably with the employment rolls of those who have already testified as to numbers.

Now in war everything is essential. The Pennsylvania Railroad is essential, the steel plants are essential, the automotive plants are essential, nurses are essential, foods are essential, soldiers, manpower, everything is important in national defense, including the watch industry.

The greatest need, of course, when you consider essentiality, is for a strong economy because a strong overall economy furnishes the revenue that the Government must have to sustain any long and big war.

Therefore, when we consider the essentiality of the watch industry we must put it into position as to how it affects the essentiality, the basic and fundamental essentiality of the country to wage war.

During the life of the reciprocal trade agreement with Switzerland, now a little less than 20 years old, the Swiss have bought from Americans $500 million more of United States goods than we have bought of Swiss goods. There is a half-billion trade balance in our favor. And if any harsh action is taken against the imports of Swiss watch movements obviously there will be a curtailment in the ability of the Swiss to continue to buy the great agricultural and machinery products which it has bought over the last 20 years to the tune of $500 million more of our products than we have bought of Swiss products.

Switzerland now buys cotton from Mississippi, it buys tobacco from Kentucky, it buys steel and machinery from Pennsylvania. So, therefore if we are figuring on the ability of this Nation to wage a successful war we must consider as a primary factor the ability of our people to support a war. And in that respect, the Swiss trade with the United States is one of the finest of any nation in the whole world with which we have trade relations.

Switzerland is a little country. About 50,000 families are dependent for a living upon the Swiss watch industry. Quite obviously, if any harsh treatment of the importation of Swiss watch movements is had it will affect very seriously the whole economic well-being of Switzerland and deprive us in large part of a customer for the sale of American goods which we have enjoyed over the last 18 years.

I have heard here that the watch people, Elgin, Hamilton, and Waltham particularly—because Mr. Bulova talked only on national defense—are threatened with the extinction of their industries. Well, I would be the last man to want to see their industries go out of business. They have been saying this for 20 years. The testimony before the Congress in 1932, when I was then a Member, in relation to the passage of the Smoot-Hawley tariff bill, will show numerous instances where these same representatives or their predecessors said that if they did not get this, that, and the other—which they did not get in all cases—they would be out of business in a year or 2 years or 3 years in the future.

They said that in 1951 before the Tariff Commission where I represented the same people I speak for today, that they would be out of business very shortly, and they say it today.

Now let us see first how serious the situation is. It has been stated that the watch industries of Elgin, Hamilton, and Waltham are in dire straits. Let's look at the facts. Let us take Hamilton first.

In 1936 the net sales of the Hamilton Watch Co. were $4,160,000. They increased every year from 1935 to 1952, which is the last figure I have, from $4 million in 1935 to $19,419,000 in 1952, an increase of more than 400 percent. The net sales of Hamilton, therefore, went up as I have indicated. The total assets of the Hamilton Co. have increased from $5,192,000 in 1935 to $22,300,000 in 1952, and the total asset increase has been every year; the line has gone up just like that. The net worth of the Hamilton Co. has increased from $4,900,000 in 1935 to $12,200,000 in 1952, 300 percent.

The company has paid to stockholders cash dividends of more than $10 million during this period, and, in addition thereto, it has enlarged its plants, its machinery, acquired additional companies, and put itself both financially and from the standpoint of plant and other things in a stronger position.

Now let us look at the Elgin Watch Co. In 1935 the total sales of the Elgin Watch Co. were $7 million. They went up every year, as you can see, until in 1952, instead of sales of only $7 million, they had reached $50 million, a gradual increase every year. Likewise, the total assets of the Elgin Co. have increased from $13,800,000 in 1935 to $48 million in 1952.

In 1935 the net worth of the Elgin Co. was $12,800,000. In 1952 it was $23 million. During this same period the Elgin Co. paid out to its stockholders in dividends $14,600,000.

I cite those two examples to show you that these companies are not teetering on the verge of bankruptcy. They are stronger today than they have ever been. Their sales have increased. It is true they have been augmented some by national defense orders. Their net worth has increased, their plants have been expanded, their machinery potential has been expanded, and they have paid dividends during all these periods of years. So that I do not think you are confronted with the extinction of the domestic watch companies. And nobody here that I know of wants them extinct, including myself and the organization which I represent.

Therefore, I think, on the naked facts which have been submitted from their own financial reports publicly made, we can assume they are about as healthy as most other industries in this country, and the progress they have made is phenomenal.

Here is a fact that you must take into consideration, I believe, in reaching a decision; The tariff on watches is graded; the tariff on a 1- to 7-jewel watch is so much; from 7 to 5 it is so much; from 15 to 17 it is so much, and on up from 17 it is still more. Now the fact of the matter is that in the more-than-17-jewel watch movement, which represents the trend of American watch purchases, the tariff is today $10.75 per movement, just to get the movement in the country. The result is that that tariff is so high that last year the domestic manufacturers made a million and a half movements of more than 17 jewels, and only 5,000 movements were imported in this category.

Of those 5,000 that were imported they were specialty watches like calendar watches and so on, which are not made in this country.

So, you have 5,000 watches imported in this category against 1,500,000 that this country made, and yet they want a tariff increase on the 17-and-less jewel movement, which is the only market that the people I represent now have.

Quite obviously two things would flow from an increase in tariff on the 17-and-less jewel movements. No. 1, the increased tariff would mean more price, a higher price that the consumer would have to pay, which would hurt the whole watch industry. Secondly, it would cut down the Swiss ability to keep on buying the things which we have sold them to the extent of $500 million more than we have bought of their goods. Indeed, the amount of food, of agricultural products which America sells to the Swiss in that one category alone is more per year than all the products we buy from Switzerland, to say nothing of the other things.

I do not want, however, to fail to stress that in the more-than-17-jewel movement, which is the higher-priced watch, the field where the margin of profit is larger, the domestic people make a million and a half movements, and only 5,000 are imported because of the prohibitive tariff, and these gentlemen have a monopoly in that field, and the trend is to the higher-movement watches.

Senator STENNIS. Pardon me just a moment.

In 18 jewels and up——

Senator DUFF. Seventeen.

Mr. TYDINGS. That is right, anything above 17.

Senator STENNIS. In 18 and up you imported 500,000?

Mr. TYDINGS. No, sir; 5,000.

Senator STENNIS. You used the word 500,000.

Mr. TYDINGS. Forgive me; I meant to say 5,000. Thank you for the correction.

Senator STENNIS. And there were 1,500,000 made here?

Mr. TYDINGS. That is right.

Senator STENNIS. Of 18 jewels and up?

Mr. TYDINGS. That is right.

Senator STENNIS. All right.

Senator COOPER. Did you say 5,000?

Mr. TYDINGS. Just 5,000. That is all that were imported, and 1,500,000 were made in this country. That is something these gentlemen do not tell you.

Senator COOPER. How about the figures underneath?

Mr. TYDINGS. In the figures underneath the imports exceed the manufacture, but that is the only place we have to do business.

Senator COOPER. What are the figures on that?

Mr. TYDINGS. I will get them for you. I do not happen to have them.

Senator DUFF. One of the things that I recall was that they made a statement—somebody did here—that while they were in good financial shape, and I think they all agree that they were, the testimony was, to the best of my recollection, that while they made money they made it on other things than the watches that they made.

Mr. TYDINGS. That is true up to a point.

Senator DUFF. Their success was attributable not to the profits on watches but on the things exclusive of watches that they had manufactured.

Mr. TYDINGS. That is true up to a point. I believe that during the war, with everybody who had war contracts, they were practically all let in the last war, as you well know, on a negotiated basis, so that there was practically no opportunity to lose money. They were all worked out and renegotiated on a basis of 6 or 8 percent profit before

taxes. However, even before the war the figures which I mentioned are nothing more than a straight line that is ever-inclining upward, and when the war came the line continues right on up.

Now it is only fair, and these gentlemen deserve great credit for the fact that they did, to a large extent, try to turn over their plants to war production. Some of them, I don't believe, made many watches. Maybe some of them did not make any. And they deserve all the credit in the world for that. They had profitable contracts, however, to take their place. But when the war was over they had some little difficulty regaining their watch markets.

But it is remarkable to look at the figures to see how quickly they did regain them.

They are fine people. I am not here attacking them. They are patriots; they are great people. They have been opponents of mine for 3 or 4 years, and I have enjoyed knowing them, and have the highest respect for every one of them. They are good Americans and deserve a fair deal. They are entitled to it. But I do not think, quite often, they give all the facts upon which that fair deal ought to be made, and that is why I am here this morning.

They want to make more money and I hope they do, but they must give our people who are Americans, who employ nothing but Americans and have nothing but American capital, and who employ practically as many Americans as they do, they must give us a chance to live, too, and not deal a body blow to one of our best customers that is buying cotton from Mississippi and tobacco from Kentucky and from Maryland and from Pennsylvania and so on.

There is a place for us all to live, and what I am here for this morning is to give them their chance and to ask them if they won't be good enough to let us have a chance.

Senator STENNIS. Pardon me. I was not here at the beginning. Whom do you represent?

Mr. TYDINGS. I represent the American Watch Association, which is composed of American citizens, financed by American capital, and employing exclusively American labor. There are such plants as Benrus, Gruen, Longine-Wittnauer, and, in some respects, Mr. Bulova. In this case Mr. Bulova has never been a party to any of these controversies before. He is down here today, and by his own statement he is here in the interest of national defense, and none of the other considerations of tariff and so on. He says that is something he won't discuss.

Senator DUFF. As was stated at the outset of this inquiry, our primary concern is not at all with the tariff.

Mr. TYDINGS. That is right.

Senator DUFF. Our concern is the essentiality of this skill in the event of hostilities.

Mr. TYDINGS. I am coming to that, sir. The only reason I mention it is that they said they had asked for both quotas and for higher tariffs here the other day, and I felt you should have some little picture if it has any relationship to what is before us.

Senator COOPER. What companies you represent, as I understand it, make no watch movements?

Mr. TYDINGS. Some of them make parts of movements. For example, Mr. Bulova came over here some 20 years or more ago, and he was able then to bring Swiss machines with him, and he has taken

the small beginning and built up a magnificent manufacturing plant, which I do not believe he could have done unless the situation had been aided to a large extent by the Swiss. So we have one new industry in the last 30 years, Bulova Watch Co., which is a magnificent industry, which Mr. Bulova has gradually built up so he can make a whole watch. I think the figures show that, roughly, he imports about half the movements and makes about half.

Mr. BULOVA. We are importing three-quarters of the movements, and there is another element in that, that if the chairman cares to have it I will be glad to explain.

Mr. TYDINGS. These other companies, like Gruen, are gradually making more and more of the movements which they are now importing in large measure. For example, they set up the machines and make a base plate, and after they get that running pretty well they don't buy as many base plates from Switzerland, and they go on with the pinion. So many of these concerns are moving more and more into the manufacturing business. Indeed, one of the large plants, the Benrus Watch Co., that I represent and that has opposed these gentlemen in tariff matters, tried to buy the Hamilton Watch Co. The Hamilton Watch Co. took them to court and did not want them to buy it. They were importers. They were willing to buy this plant. That is how much confidence they had that they could make and sell watches even with existing tariffs.

Let me continue.

What has been the pattern of this whole attack? I won't describe it, but first it was a plea for increased tariffs. Then there was a plea before the Office of Defense Mobilization. We had to go down there and present our side. Then there was a plea to get the customs regulations changed, which would have been, in effect, an increase in tariffs. Then there was a plea for individual increased tariff bills in Congress introduced mainly by men who had domestic industries in their own districts. Then there is this hearing.

Now as to the essentiality, I say the watch industry is an important part of our national-defense picture, but it is only a part, and it is only a segment of the overall essentiality of the strong economy which, above everything else, in all of its ramifications, is needed to support a major-scale war. I know that. I served on this committee during two wars, and I want to tell you if we had not had a dynamic and fine widespread economy God only knows what would have helped us.

Now everything is necessary in war, nothing escapes. In Britain, in World War II, they needed acid that they could not get. Submarines were cutting down the shipment of acid from our country, and the British were desperate. They hired a scientist named Chaim Weizman, and he developed this particular ingredient out of horse chestnuts and supplied the British Army with this explosive. He was, as you all remember, the leading exponent of a place in Israel for the Jewish people. They offered to knight him. He said he would rather not if the British would give his people a homeland, and that would be a reward for his services.

I only mention horse chestnuts. I remember we had to have peach kernels in World War I to make gas masks out of. Everything is essential. And for me to stand here and say that the watch industry is not important to national defense would be a falsehood, and I would not attempt to say it. But I do think that these gentlemen, as I shall

show by facts, have overrated it, and the degree of importance which they put on it, to a large extent, I do not believe is bottomed on fact.

Now I am going to talk about jewels. I have held handsful of jewels in my hand and gone through the Swiss watch factories and watched them put the jewels in the movements. They only cost a few cents apiece. They are very cheap. They are synthetic. Somebody said here that we ought to have 75 million jewels to run a war. Why don't you stockpile them? It will only cost about $200,000 to stockpile 75 million jewels, and you will have enough for 4 or 5 years. There is no question, there is no trouble there. All you have to do is put out the order, or build new plants. Mr. Bulova is already starting a plant out in North Dakota, and I am glad he is. But if we are really going to have to have these jewels so badly for airplanes and watches and all these instruments and bombs, all we have to do is stockpile 75 million of them. We already have invested $4 billion in stockpiling.

I remember on this committee I appointed a separate committee of which Senator Johnson was the head just to study stockpiling, and we had rubber and rope and quinine and tin, and everything that we could think of that might be shut off in time of war, and for which we had no synthetic plants that could furnish the amount of that product that we needed. So, if the jewel industry, if the jewel business, as is testified here, is so important, gentlemen, you can put 75 million jewels in storage for $250,000, and you have no jewel trouble for a 5-year war. Or you can subsidize a new plant. That is what we did. We stockpiled these things that were in short supply. We can enlarge the plants.

I have heard a lot here about skills and toolmaking machinery and how many skills were needed. The truth of the matter is that there are very fine skills in the watchmaking business. The first thing you need are good toolmakers, and die and jig makers. Once the tools and the jigs and the machines are set up, as has been testified in other places, it is largely a mass production operation. Why, these gentlemen themselves have told you how many millions they turn out in a week. How could you turn out millions unless you had a machine punching them out just as fast as that? It stands to reason it is a mass production operation. The skill is needed in the tool and die making. But if they made them 32 million in a month, or whatever it was—the figure was fantastic—it stands to reason that nobody took each one of them and examined it with an eyeglass and put it down. They went through on the production line. I have seen it myself. They have machines that will drill 18 holes in one operation in one of these base plates. I had some, but I could not locate them this morning. It is mass production.

You need skills, of course, in the watchmaking business. Besides the tooling, when you start to assemble, there are people who become very adept at using their fingers with tweezers. They pick up these jewels and drop them on and the machine comes down and punches them. It would take me a long while to do that, maybe 10 times as long. But that is a skill. That does not take years and years to learn to pick up a jewel in a pair of tweezers and put it down and have a machine come down on the plate and stamp it into place.

If these plants are so concerned about national defense why do they not in wartime let some of their machinery which makes these time devices, fuses, go out in the hands of other companies so they

can duplicate their own work? You cannot get their machines away from them, and I don't blame them. They don't want somebody else in the watch business. They are afraid that the machines will be copied. But the whole future of the Nation is at stake. All they have to do is turn loose some of these machines, and any other company will go ahead and punch these things out, which they have been doing. But they do not want to turn their machines over and I do not blame them. I am not advocating it. They are in business to make a living. They are certainly not going to throw away their birthright.

Now we get down to the nub of it. Only domestic watchmakers can make time fuses. Well, it is not necessary for me to offer any evidence because Mr. Pike and others who testified here who represent the War Department said they are an important industry, important to the national defense, but he wouldn't say that they were indispensable and that nobody else could do these things because Mr. Pike knows as I know, and I am going to show you by an official document, that there are 8 or 10 other concerns that make these same things that you have been seeing all these exhibits about.

Before the Tariff Commission in 1952 this statement was made, and I have the brief of these gentlemen here which I shall read. In italics right at the end of it says:

> It is incontrovertible that the sole source of production of vital timing devices for fuses is the horological industry. No other industry has been able to produce them successfully. If the domestic timepiece industry is crippled or destroyed by excessive attrition from import competition our capacity to produce critically needed defense items of this type will be correspondingly crippled and destroyed.

When I read that statement and heard testimony in support of it, having had some little experience on this very committee with this same subject, but not being certain just what the facts were, I called up my colleague, Senator Hunt, and I told him that I understood nobody could make these time fuses but the watch industry, and I said, "This is serious. I think there ought to be an inquiry made as to whether or not this is so. Would you make it? And, if it is not classified, I would like to know the result of it. If it is classified you do not have to tell me anything about it."

He said he would be glad to. I said, "It is in your committee and it is a matter that you are concerned with, and, as I recall, I appointed you on a committee of this kind when I was chairman of the Armed Services Committee."

So Senator Hunt wrote down to the Department of Defense, and on the 2d of March 1954, he received this letter from the Assistant Secretary of Defense, Mr. C. S. Thomas, addressed to the Honorable Lester C. Hunt, and I am going to give you each a copy of it so you can follow me as I read it:

> With further reference to your telegram of February 19 and our reply of February 24, 1954, the following information on complete timing devices made under prime contracts in the current program has been obtained by telephone reports. The figures, therefore, are subject to correction when the official confirming reports are received from the departments.
>
> Eastman Kodak has delivered 1,875,000 mechanical time fuses (M500–A–1 and M501–A–1) to the Army in the period from July 1, 1950, through December 31, 1953. Information on the peak month of deliveries is not yet available.

Now on the page just behind that you will find that the peak month is given:

Army peak acceptances since Korea from Eastman, 150,000 M500–A–1 and M501–A–1 fuses in October 1953. Let's go back to the original letter:

Eastman Kodak also has delivered 7,403,000 complete rear fitting safety devices to Navy since July 1950, and is tooled for production of 120,000 per month on a 1-shift, 5-day-week basis.

The George W. Borg Corp. has delivered 322,000 M502–A–1 mechanical time fuses to Army and 625,000 M61A–2 mechanical time fuses to the Army since July 1950. Data on peak rates of production are not yet available.

Eclipse Machine Division of Bendix Aviation has delivered 684,000 rear fitting safety devices to Navy since July 1950, and is tooled for production of 90,000 per month on a 1-shift, 5-day-week basis.

The Thomas A. Edison Co. completed 62,000 rear fitting safety devices for the Navy Department in the period after July 1950. The Edison contracts, however, have been terminated, and data on peak production rates are not available.

Army reports that the National Cash Register Co., the Underwood Corp., and the Eclipse Pioneer Division of Bendix Aviation Corp. were Army prime contractors for complete mechanical time fuses during World War II, but are not prime contractors in the current program.

Subsequent to that, on March 24, Senator Hunt received the following and sent it to me, and I have already read the Eastman business, so now I will read these:

Army peak acceptances from George W. Borg Co.: 65,000 M502–A–1 fuses in October 1953, and 74,900 M61A–2 fuses in March 1953.

There are two different kinds of fuses. There are 140,000 in 1 month.

Thomas A. Edison was tooled for peak production of 10,000 rear fitting safety devices for the Navy on a 1-shift, 5-day-week basis.

Senator STENNIS. Pardon me one moment, Mr. Chairman.

Long before this meeting was set I had an appointment that I just could not cancel out. I am compelled to leave very much against my wishes and with great regret. I will come back as soon as I can. Do you expect to be here some 30 or 40 minutes?

Senator DUFF. I imagine we will finish in another 25 minutes.

Senator STENNIS. I want to read the rest of the Senator's statement. I assume this will be available tomorrow.

Senator DUFF. Yes, sir.

Mr. TYDINGS. There is concrete proof that other concerns besides the domestic watch industry have made these devices.

Now I would like to revert to the jewels for just a moment. I hold in my hand the official report of the United States Tariff Commission, 1947, when I was not associated with this endeavor, and on page 37 here is what the Commission said about jewels:

Although few jewel bearings of the sizes used in watches are ordinarily produced in the United States, the raw materials for making such bearings are abundant here. Knowledge of how to make such bearings also exists in the United States, and some bearings, mostly of larger sizes than are used in watches, are regularly made here. Domestic costs of production, however, are much higher than costs abroad and are likely to remain so unless the technological improvements should be made which would obviate the need for so much hand labor. Even with the increased production induced by financial assistance from the Government during the past war, domestically produced jewel bearings supplied only a relatively small part of the domestic consumption, and since 1954—

and so forth.

What they advocate there is a stockpiling of jewels. There is no difficulty about it. And it certainly is important, very important, and it will cost very little money.

The alternative to that, in my opinion, is to encourage people like Mr. Bulova and others to enlarge those plants as rapidly as possible, but lay by an insurance amount of these jewels in the meantime.

Now when I got this information that I have just read from the Defense Department I asked that a man go and talk to these different company officials and find out what they had to say about their work. This is a report made, and I am going to read one of them. I will file it all here for the committee, but I will read one short paragraph.

The George W. Borg Corp. is perhaps one of the most highly qualified corporations in the United States for the production of horological devices. It is so qualified, in fact, that within the last few years the Borg Corp. had actually considered entering the field as manufacturers of jeweled lever watches, but were deterred only by the fact that the problems of merchandising and marketing were so far afield from their normal experience that they decided for the time being not to enter the new field. In fact, however, they presently have the mechanical and production skills requisite for manufacturing jeweled lever watches.

George W. Borg Corp. produces and ships hair springs of such fine quality that they are purchased by manufacturers in Switzerland.

Especially significant is the experience of Borg Corp. during World War II in the production of mechanical time fuses. Borg found it necessary during that period, because of a lack of assistance that the domestic watch companies could give them, to make their own equipment and develop facilities to make mechanical time fuses. They made their own Swiss automatic screw machines and other machines for that purpose. They found, too, as a result of their experience, that many parts normally made on Swiss automatic machines could now be produced on their own Brown & Sharpe machines. They developed many methods of increasing production.

I will file this whole report with the reporter there because the committee wants to get away. I would like to read others.

Senator DUFF. Without objection, that will be made a part of the record.

(The report follows:)

AMERICAN WATCH ASSOCIATION, INC.,
New York, N. Y., March 24, 1954.

OFFICE OF DEFENSE MOBILIZATION,
Washington, D. C.

(Attention: Mr. John F. Hilliard)

Gentlemen: This paper has been prepared for the guidance of the Office of Defense Mobilization in regard to one phase of the competition between the American assemblers of imported watch movements and the American manufacturers of watches and watch movements. This aspect of the competition concerns the claim by American manufacturers of watches and watch movements, that they are unable to compete with firms which import, assemble and merchandise watch movements from abroad. The American manufacturers say that they are in danger of being forced out of the watch business. They assert that the American watch manufacturing industry contains certain skills found nowhere else in the entire American economy, and that with these skills are produced certain equipment essential to national defense, particularly mechanical time fuses and timing devices. They argue that unless imports of watch movements are drastically curtailed these skills will be lost to the country with results disastrous to the defense of the United States.

It is the position of the American Watch Association that this defense aspect is nothing but a red herring: a scare argument introduced by the American manufacturers into a purely economic contest with the American importers, in an effort to obtain governmental assistance.

POINT I—SKILLS FOUND IN WATCH MANUFACTURING ARE PRECISION SKILLS, NOT WATCHMAKING SKILLS, AND ARE FOUND IN SEVERAL RELATED INDUSTRIES USING PRECISION EQUIPMENT.

Much has been made by the American manufacturers of watch movements of the argument that in the watch industry there necessarily exist certain skills peculiar to that industry, skills which cannot be found anywhere else in the

entire American economy. The American Watch Association flatly denies that such is the case, for the following reasons:

There is no mystery about the making of a watch or a watch movement. Required are (*a*) certain types of precision machinery, (*b*) highly skilled labor, particularly that of tool and diemakers, and of so-called setup men (men who are able to adapt precision machines from the production of one product to another), and (*c*) the experience that can be gained only by the continued production of material—such as a hairspring—which requires pains and skill and manufacturing according to unusually fine tolerances.

These are the only distinctive elements in the manufacture of watches and watch movements.

The American Watch Association contends that any survey of the American economy will reveal important segments, including the watch industry, which require and utilize precision machines and other precision equipment and the skilled labor to operate them. The American Watch Association, with the aid of representatives of Benrus Watch Co., communicated with and obtained useful information from officials of the following firms which have made or are making significant contributions to the production of mechanical time fuses and mechanical timing devices.

Names of some suppliers of mechanical time fuses: Eastman Kodak Co., Rochester, N. Y.; National Cash Register Co., Dayton, Ohio; Eclipse Machine division of the Bendix Aviation Corp., Elmira, N. Y.; Underwood Corp. (Underwood-Elliot-Fisher), Hartford, Conn.; King-Seeley Corp., Ann Arbor, Mich.; Gibb Manufacturing & Research Corp., Janesville, Wis.; Thomas A. Edison Co., West Orange, N. J.; George W. Borg Products, Delevan, Wis.

In addition to these American companies, outside of the jeweled lever watch and clock industry, are summaries and reports from the following: Frankford Arsenal, Philadelphia, Pa.; International Business Machines Co., Ltd., Toronto, Canada.

The following information was obtained from officials of the Eastman Kodak Co.:

The Eastman Kodak Co. operates in the Rochester area with complete independence and does not rely on the domestic watch companies for components, machinery, design, or assistance of any kind. Eastman Kodak has been responsible for the complete manufacture and assembly in recent years of the M500 series (new name for M–43) mechanical time fuses and rear fitting timing devices, which are a clocklike mechanism and which are identical with the products being manufactured by the domestic watch companies. Eastman Kodak reports currently that they have six research and development projects underway related to defense and have had at recent times a total of 14 research and development projects.

Eastman Kodak's production facilities and manpower at the plant where its mechanical time fuses are made, total far in excess of that of the combined capacity of the domestic jeweled watch companies—Elgin, Hamilton, and Waltham. This one plant currently employs about 12,000 people, approximately 250 of whom are in tool and die work. The tool and die department has in the past successfully made dies for fuse gear train and escapement gears and other small parts which are exact replicas of the work produced by the domestic watch companies. Eastman is fully equipped with screw machines, pinion cutters, gear hobbers, pivot polishing machines, and other necessary facilities.

It is interesting to note that the only component purchased on the outside by Eastman Kodak is an escapement spring of the type normally supplied by domestic watch companies. However, Eastman Kodak purchases this part from a company in Clifton, N. J., whose main business, operated under the name Windsor Manufacturing Co., is the manufacture of ping pong balls.

Independent subcontractors, tool and die shops, and manufacturing plants employing a large number of skilled mechanics, engineers, etc., are readily available in the Rochester area and provide a basis for the immediate expansion of Eastman's tooling and production capacity in the event of war. The people at Eastman estimate that there are over 25 such shops in the immediate area on which they can depend.

Since the domestic companies, in the last analysis, rest their claim to essentiality on the fact that they are the only ones capable of producing a jeweled watch movement, we feel that it is highly relevant to state that the production heads of Eastman Kodak declared flatly and unequivocally that their company could make precision chronometers for the Army and Navy, if required, and in approximately 6 months.

The following information was supplied by officials of the National Cash Register Co.:

On the basis of the company's extensive experience in producing the M–43 mechanical time fuse during World War II, and on the basis of their company's highly integrated production skills and equipment, they could again enter into production of complete fuses and fuse parts and would not be dependent in any respect on watch companies. During World War II, National Cash register manufactured within its own plant all parts for its fuses, including the escapement spring. National Cash Register's current work force totals about 12,000 and its affiliated group of subcontractors are represented in about 25 shops for tool and die work and for parts manufacturing.

The company has facilities for the performance of all the necessary tool and die work as well as for the manufacturing of all parts and only relies on subcontractors to supplement requirements at peak workloads.

National Cash Register has facilities for making machines and equipment for the production of mechanical time fuses. They have the engineering facilities and normally make a good deal of their special equipment.

In addition, they stated they could make chronometers, an item which the watch companies have stated was peculiarly within their own manufacturing and engineering skills.

The following information was obtained from officials of the Eclipse Machine Division of the Bendix Aviation Corp.:

Eclipse began to make mechanical time fuses, including all components and assemblies, in 1939. Their production rate of 500 a day was gradually expanded until they were producing 25,000 units a day. Not only because of their already acquired experience in making mechanical time fuses, but for the reasons given below, they are completely confident that they could resume fuse production at substantially any rate required by the Government. They felt that they are especially qualified since Eclipse could draw upon a large number of tool and die shops and small manufacturing shops in their area and in the general area from Rochester, N. Y., to Harrisburg, Pa. They pointed out that these shops not only possess the skills and facilities, but they have a very high-grade working force, including skilled mechanics. These tool and die and production shops currently supply such companies in their general area as Westinghouse, Remington Rand, Bausch and Lomb, Ansco and Taylor Instrument Corp. In the opinion of the production executives of Eclipse, there are no special or unique qualifications in the watch industry required for mechanical fuse manufacturing which they could not fully match. They stated that they would be able to move faster and expand production to a higher level than any of the domestic watch companies. They emphasized that the skills required for mechanical time fuses are essentially engineering skills such as they now utilize and are more closely related to the problems of production engineering than to that of producing watches. They too stated they could manufacture chronometers.

They are fully confident that they could produce any timing device required and cited the fact that they are now producing a high-precision mechanical timing device on which they could not supply further information because the product was classified.

The following information was obtained from officials of The Underwood Corp. (Underwood-Elliot-Fisher):

The Underwood Corp. is currently engaged in the manufacture of a highly secret fuse and in the production of gyroscopes, among other defense items. It is their opinion that the secret fuse contains many components which are similar to those of a mechanical time fuse. However, they stated that they know of no watch company making this special fuse.

Underwood's officials stated conclusively that watch experience is not necessary for fuse manufacture.

During World War II, while on production of the T–47 (now the M–129) fuse, they obtained pinions and gears from United States Time Corp., a pin lever watch and clock manufacturing company. They stated that this arrangement was attributable, not to their incapacity to manufacture the special parts, but to the expanded production demands at that time.

The Underwood Corp. now commands a work force of approximately 5,000 in their Hartford and Bridgeport plants, and a special research group at New Hartford, Conn.

The following information was obtained from an official of the King-Seeley Corp., Ann Arbor, Mich.

The King-Seeley Corp. has produced and is producing M–500 series fuses and is fully capable of producing virtually all of the parts without the assistance of outside companies. It can produce its own tools and dies and also has the capacity and ability to build some of the special machines, if necessary. As an example, they are presently producing pivot polishing machines such as were produced by Eastman Kodak during the last war.

Beyond their own capacity and facilities, they have available to them in their immediate area tool and die shops and manufacturing shops capable of making both the tools and dies and the parts, if this should become necessary to meet peak requirements. They have gone to watch manufacturers for a few parts as a matter of convenience rather than of necessity. They acquire their hair springs from the Borg Corp.

The opinion was expressed that fuse manufacturers, other than the domestic watch and clock companies, could get into the production of mechanical time fuses or similar items as quickly as anyone else.

Information obtained from officials of Gibb Manufacturing & Research Corp.:

The Gibb Co. received a prime contract for 3½ million mechanical time fuses during the early part of the Korean war. At the time, the Gibb Co. was loaded to capacity and subcontracted to the Gruen Watch Co., in Cincinnati, Ohio, an importer of Swiss watches. The work at Gruen was supervised by Gibb personnel. The Gibb Co. reports that they could have completed this work in their own plant if it had not been for previous Air Corps contracts.

Commenting further on the manufacture of fuses, Gibb representatives said that Gibb was chosen because of their background in this kind of work, and because, during the early part of the war, when the Ordnance Department wanted to get started on the manufacturer of fuses, the domestic jeweled-watch industry was not interested in getting Government work. However, when the United States Government activated controls on materials, the jeweled-watch industry very quickly jumped over to Government work.

It was pointed out that the Gibb plant possesses automatic screw machines, pivot polishing machines, Safags, Mikrons, and Pederman screw machines. Gibb also has tool-making facilities but, like other companies, turns to outside sources to supplement its own tool and die work. It was stated that there are plenty of tool and die shops in the southern Wisconsin area, and that the company does not depend in any way on the domestic watch industry for any help in the manufacture of mechanical time fuses. Hair springs were furnished to them by the Borg Corp., and other springs were furnished by Perryman of Clifton, N. J., both outside of the watch industry.

Gibb officials stated that, starting from scratch, including making of all dies, fixtures, tools and gages, they could be producing new fuses within 6 months. In connection with the 501 and 500 series fuses, the gages and fixtures are now owned by the United States Government and, therefore, they could get into production within approximately 4 months.

They stated that the Gibb Co. could make chronometers, and estimated it would take approximately 6 months.

An official of the Gibb Corp. also stated that it was his belief that a good number of the fuses could be made by such nonwatch companies as Hoover Vacuum Cleaner, Monroe Calculator, Burroughs Adding Machine, Minneapolis-Honeywell, Sangamo Co., and Badget Meter Co. Most of these companies, he pointed out, are involved in making precision instruments for the Air Corps.

The following information was obtained from past and present officials of the Thomas A. Edison Co.:

The Thomas A. Edison Co. has had a great deal of experience in the production of M-43 fuses. During World War II, on the instructions of Naval Ordnance, they purchased from watch companies certain components such as escape arbors, pinion blanks, centrifugal gears and other parts, all of which were supplied to them by the Benrus Watch Co., an importer of watch movements from Switzerland. However, the Edison Co. representative stated flatly that if these instructions had not been given by Naval Ordnance, his company would have made the same parts themselves because they were capable of doing so. They possessed all the machinery and facilities for making these parts.

It was pointed out that Edison started from scratch and ended up with the best firing record of any manufacturer of mechanical time fuses in the United States. At no time was Edison dependent on the domestic watch manufacturing companies for their skills or assistance.

Mr. Wehrenberg of Westfield, N. J., was interviewed because he was at one time research director of the Special Products Division of the Thomas A. Edison

Co. (1940–45) and was manager of the same division from 1945–47. During this time he was in charge of production of the M-43 mechanical time fuse for Edison.

His opinion was similar to that given by all others interviewed that watch manufacturing experience is not essential to fuse manufacturing. He pointed out that the Edison Co. had made substantially all the parts necessary and possessed all the equipment such as hobbing machines, automatic screw machines, pivot polishing machines, etc. He stated that in the few instances in which they purchased parts or components from jeweled watch or pin lever watch companies, these purchases were made as a matter of convenience. The Edison Co. possessed, however, the capacity to make everything they purchased in this area.

Perhaps the most important statements brought to light in our interview with Mr. Wehrenberg are the following:

Watch engineering and manufacturing experience are not essential to the design and manufacture of mechanical time fuses. Fuses are designed especially to satisfy specific Ordnance fuse objectives, and while they may have a clock mechanism, this clock mechanism has to be so engineered as to satisfy these objectives. For instance, the weight and composition of the parts and the centrifugal and other physical forces which are created when the fuse is either dropped from an airplane or used in an artillery shell necessitate a design of parts, such as pinions and gears, having characteristics different from those in a watch. In other words, the arrangement of a train of pinions and gears is a function of different factors. Accordingly, in the opinion of Mr. Wehrenberg, it might even be better for nonwatch experience to be utilized than to utilize watch experience.

He felt, therefore, that the engineering skills developed by Edison, the Underwood Corp., Eclipse Division of Bendix and others were far better suited to this work than those of the domestic watch companies.

The following information was obtained from officials of the George W. Borg Corp.:

The George W. Borg Corp. is perhaps one of the most highly qualified corporations in the United States for the production of horological devices. It is so qualified, in fact, that within the last few years the Borg Corp. had actually considered entering the field as manufacturers of jeweled lever watches, but were deterred only by the fact that the problems of merchandising and marketing were so far afield from their normal experience that they decided for the time being not to enter the new field. In fact, however, they presently have the mechanical and production skills requisite for manufacturing jeweled lever watches.

George W. Borg Corp. produces and ships hair springs of such fine quality that they are purchased by manufacturers in Switzerland.

Especially significant is the experience of Borg Corp. during World War II in the production of mechanical time fuses. Borg found it necessary during that period, because of a lack of assistance that the domestic watch companies could give them, to make their own equipment and develop facilities to make mechanical time fuses. They made their own Swiss automatic screw machines and other machines for that purpose. They found, too, as a result of their experience, that many parts normally made on Swiss automatic machines could now be produced on their own Brown & Sharpe machines. They developed many methods of increasing production.

Their executives state that because of the reluctance and unwillingness of the American watch companies to supply them with parts and assistance during the Korean war, the Borg Corp. made the decision to produce all of their own parts.

They advised that they have a tool and die shop capable of making any of the tools or dies necessary for mechanical time fuse production. They also advised that in the southern Wisconsin area there is a substantial number of subcontractors that they can call upon for making either parts or tools and dies if necessary to meet peak-load requirements.

In conducting this investigation we had a production executive and a chief engineer visit the Frankford Arsenal. Officials of Frankford Arsenal made the unsolicited statement that they did not consider the domestic jeweled watch industry essential to the manufacture of mechanical time fuses and that this statement was recently made to representatives of the Defense Department. Interestingly enough, in inquiring into the fuse components and their manufacture in the United States, they informed us that the following additional companies made contributions through subcontracting:

Part name	Company	Address	Product
Escapement arbor	Automatic Specialty Co.	Baltimore, Md	Automatic screw machine products.
	Everlast Metal Products.	New York, N. Y	Aluminum ware.
	King-Seeley	Ann Arbor, Mich	Oil gages, ammeters, speedometers, etc.
Centrifugal gear (blanked)	Farrington Mfg. Co	Boston, Mass	Covered metal jewel and display boxes, plastic display boxes, metal specialties, charga-plate credit service.
	Thomaston Special Tool Co.	Thomaston, Conn	Special tools.
	Heath Co	Benton Harbor, Mich	Radio test equipment kits.
Escape gear (wheel)	King-Seeley	Ann Arbor, Mich	Oil gages, ammeters, speedometers, etc.
	Eastman-Kodak Co	Rochester, N. Y	Photo film, paper, apparatus, supplies, and chemicals.
Gear No. 1, 2, 3, and 4	M. H. Rhodes Co. (also Ingraham Watch and New Haven Clock).	Hartford, Conn	Timing devices for delay action, electrical and mechanical; radio relays; automatic interval electrical switches; parking meters.
Gear No. 5	Obex Mfg. Co., Inc	Lynbrook, Long Island, N. Y.	Cameras, projectors, instrument and precision parts.
	Gruen Watch Co	Cincinnati, Ohio	Watches.
Adjustment guide	Eastern Watch Case Co.	Waterbury, Conn	Watchcases.
Escapement levers [1]			
Pinions Nos. 1, 2, 3, and 4	Mailly Mfg. Co	Waterbury, Conn	Swiss screw machine products.
	Howard Clock Products.	Waltham, Mass	Parts manufacturer.
	Bristol Instrument Gears.	Bristol, Conn	Gears and pinions, gear assemblies, etc.
Pinion No. 5 [2]	Woodside Screw Machine Co., Inc.	Woodside, N. Y	Screw machine parts; Swiss automatic.
	Lormar Instrument Co.	Neptune, N. J	
Escape pins	Torrington Co	Torrington, Conn	Needles, needle bearings, bicycle spokes, nipples, pedals, handle bars, swaging machinery, small metal specialties, precision machined and ground; pins; blades; pivots; studs.
Firing pin shaft	General Phonograph Mfg. Co., Inc.	Putnam, Conn	Pointed steel goods.
Set back pin	Everlast Metal Products.	New York, N. Y	Aluminum ware.
	Specialty Screw Machine Products Co.	Lancaster, Pa	Screw machine products, Swiss work, instrument parts, special screws.
	Revere Camera Co	Chicago, Ill	Cameras.
Plates Nos 1 and 7 [3]	Forstner Chain Corp	Irvington, N. J	Jewelry.
	Eastman-Kodak Co	Rochester, N. Y	Photo film, paper, apparatus, supplies and chemicals.
	Farrington Mfg. Co	Boston, Mass	Covered metal jewel and display boxes, plastic display boxes, metal specialties, charga-plate credit service.
Escape springs	George Perryman (owner of Windsor Mfg. Co.)	Clifton, N. J	Ping pong balls.
	Borg, George W. Products.	Delavan, Wis	Electronic and mechanical equipment.
Adjusting screws	Research Development Mfg. Co.	Philadelphia, Pa	Screw machine products, Swiss work, instrument parts, special screws.
	Woodside Screw Machine Products Co.	Woodside, N. Y	Screw machine parts; Swiss automatic.
	Acme Screw Products	Dayton, Ohio	Screw machine products.

[1] All prime contractors—this is a delicate piece and is made in such a way as to be closely controlled to individual manufacturers' requirements.
[2] This is now made of hollow tubing, but the outside contours remain the same as the old pinion No. 5.
[3] Tools for these parts are made by the Moore Tool & Die Co., of Bridgeport, Conn.

Information obtained from officials of the International Business Machine plant in Toronto, Canada, regarding their mechanical time fuse manufacturing.

The company's normal business is, of course, calculating machines. It presently has contracts for the manufacture of the M–501 fuse and the M–502 fuse for the Canadian Government. All drawings and specifications are being supplied by the Frankford Arsenal at Philadelphia, Pa. For all practical purposes, this contract is being given technical and engineering supervision by Frankford Arsenal, although paid for by the Canadian Government.

IBM of Canada received its contract for this fuse in the summer of 1952. Approximately 9 months after they received their contract, they began to make delivery. At the start, some parts were supplied by other companies such as Eastman Kodak, George W. Borg, King-Seeley, etc., but in no case was IBM supplied with parts by a United States jeweled watch company. After a year's experience, IBM was producing all the parts as well as the complete fuse in their plant, except for the escapement spring which it buys from George W. Borg. The purchase of this spring from Borg is a matter of convenience rather than necessity. During this period of time, IBM had to acquire most of the necessary equipment, such as pinion cutters and gear hobbers, etc., as well as to create the tools and dies, make the parts and assemble the fuse. It makes all its own tools and dies for the parts for this fuse, including the gear dies.

IBM is now producing fuses at the rate of a thousand a day. This plant employs 1,500 people. IBM officials indicated that they could make their own machines and equipment, if necessary, in order to make the parts to build the fuse. However, this was not necessary since they were able to acquire all the machines required for the job in sufficient time to meet their delivery commitments. They have in their immediate vicinity a large number of tool and die companies who could supply them with the type of tools and dies that are necessary, and there are also small manufacturing plants in the area to whom they could farm out, if necessary, many of the small parts that are required for the job. They advise that they did not need the help of the American jeweled watch industry in order to make the fuse, nor did they have occasion to call upon them. In the interest of getting the job done at the earliest possible time, they called upon others for engineering advice and help, and it is interesting to note that the people they called on were Eastman Kodak, George W. Borg, King-Seeley, as well as Frankford Arsenal, who, as is generally known, have the manufacturing facilities and the engineering know-how for this family of fuses.

It is also interesting to note that, whereas Canada may have called on us during the last war for mechanical time fuses, there is now a Canadian plant set up and self-sufficient for the manufacture of mechanical time fuses.

It is apparent from the foregoing that all American manufacturers listed above, and all others which possess the necessary machines, skills and engineering know-how, are in a position to produce for the defense of the United States all the types of materiel which can be produced in the watch industry.

The American Watch Association wishes to reiterate a point made at some length by the president of the Gruen Watch Co. at the hearing held by the Office of Defense Mobilization in Washington on February 24, 1954, that in recent years there has grown up an ever-increasing number of American firms, totally unconnected with the watch industry in any way, which have acquired the requisite machinery, skills, and engineering ability for the production of mechanical time fuses and similar types of military equipment. There is every reason to believe that the number of such firms will grow.

POINT II.—THE PRESENT PROHIBITIVE TARIFF ON IMPORTS OF 21-JEWELED WATCH MOVEMENTS GIVES AMERICAN MANUFACTURERS A MONOPOLY WHICH INSURES THE CONTINUANCE OF THE AMERICAN WATCH INDUSTRY

Statements by spokesmen for one or another segment of the American watch manufacturing industry that it is in actual danger of being driven out of business by imports from abroad, ignore one all-important fact: the Tariff Act of 1930 imposed a duty of $10.75 on the importation of every watch movement possessing more than 17 jewels. This $10.75 duty was not reduced by the Swiss-American Trade Agreement of 1936 or by any of its reenactments. It still costs $10.75 to import into the United States from Switzerland, or any other country in the world, a watch movement of more than 17 jewels. This duty is, in fact, prohibitive. Evidence that it is prohibitive is found in the fact that of all watch movements imported into the United States, those of more than 17 jewels constitute less than one-half of 1 percent of total imports. The Tariff

Commission in 1952 found not only that there is no threat to the American watchmaking industry from imports in this category, but also, that there is no complaint on the part of the domestic watch industry that there is competition from importers of watches or watch movements containing more than 17 jewels.

Recent testimony given by both the importers-assemblers and by the manufacturers of watch movements, at the tariff hearings held in Washington the week of February 24, 1954, is replete with references by both sides to the monopoly enjoyed by the American industry in the over-17-jewel category. This testimony also reveals the extent to which the American watch manufacturers are concentrating in the 21-jewel movement category, and their success in manufacturing watches of 21-jewel movements in increasing competition with the importers of watch movements with 17 jewels or less.

In other words, so long as the $10.75 duty continues on watch movements containing more than 17 jewels, the American manufacturers have a monopoly of the most lucrative portion of the watch market. This monopoly guarantees the continuance of the American watch manufacturing industry and, therefore, the continued existence of the skills which exist in the factories producing the watches and watch movements and other materiel utilizing machines, tools, and skilled labor and a high degree of engineering inventiveness.

Moreover, the American watch manufacturers not only enjoy a monopoly in the sale of watch movements possessing more than 17 jewels; they are making larger profits than at any time in their history. The 1953 financial statements of the Elgin and Hamilton Watch Cos. support this statement.

CONCLUSION

There is neither need nor justification for emergency governmental action to assist the American watch manufacturers in a healthy competitive struggle with American importers and assemblers of watches and watch movements.

Respectfully submitted.

AMERICAN WATCH ASSOCIATION, INC.,
By S. RALPH LAZRUS, *President.*

Mr. TYDINGS. I have already read this letter, so I do not need to file that.

Gentlemen, the biggest thing in our favor, I think, here is the opinion of the War Department officials. They have the initial responsibility. But before I come to that I learned from the press and from some little service in the Senate that Russia is a great potential enemy of the United States and that if we have another great war the hydrogen bomb and atomic bomb with Russian planes may be delivered on our city. I likewise have learned that Russia has no horological industry worthy of the name, and she bought a little plant out here some years ago and took it over to Russia. I likewise heard there are 5,000 jeweled bearings in a Russian plane.

It is comforting to me to know that Russia is not going to be able to attack us because she has no great horological industry. It is a matter of great satisfaction that I can get rid of some of the fear of this dread bombing war that is in the offing.

But we cannot play both sides of the street. If Russia, without a horological industry worthy of the name, is able to make all of these new weapons that we hear about, certainly they have come pretty far for a lot of people who are not a technological people, since they have secured their place in the world.

I repeat, those on the other side should not work both sides of the street. They claim here that the United States horological industry is absolutely essential to our national defense notwithstanding that other concerns in the United States who never made a watch or a clock have produced the very same weapons which the domestic horological industry has produced. This is testified to by the War Department officials.

On the other hand, the domestic watch manufacturers have stated that Russia having no horological industry bought a small United States plant and transported it to Russia a few years ago. Now if the horological industry is essential to our national defense, then a horological industry in Russia would be essential to Russia's national defense. That is true by every rule of logic. Our opponents have also stated that it takes 10 or 15 years to develop the skills in the horological industry which are essential to our national defense. Well, Russia hasn't had the small plant she bought from us for many years. Therefore, how does Russia manage to produce without a finely developed horological industry in Russia the many types of planes, fuses, and weapons which we know Russia has, along with the hydrogen and atomic bombs which we know Russia has, when she has no horological skills worthy of the name in Russia? The conflict of logic here is self-evident. Without a horological industry and the years and years claimed necessary to develop the horological skills, Russia seems to have amassed a tremendous war potential for both attack and defense. I repeat, in this hearing those for and against the proposition at issue here ought to be consistent. The facts show the inconsistency of our opponents' position and that while the watch industry in the United States is important to national defense—as all industries are—Russia without a horological industry and experience seems to be matching in every way, so far as we know, our own war potential for attack and defense. This fact should weigh heavily in the findings of this committee.

Now, I would suggest that thorough inquiry be made of the defense industry about what I have related here this morning. I would also suggest to know how many of these time fuses are being stockpiled. I assume, because we went on making them long after the war was over, that there must be and should be a substantial number of these time fuses and shells and devices on which there is a stockpile. So that there will be some latitude and leeway in case we are called quickly into another war, that we have them available. Furthermore, I think there ought to be an inquiry as to whether all these tools and machines which were paid for by our Government—although made by various plants both in and out of the watch industry— are being stockpiled.

I understand from one witness that after World War I many of these tools were not gathered up by the Government, and I think it was Mr. Ingraham who told me he thought they might be needed some day and he put his away. So when World War II came he got them out and he had a big stock.

I think one of the first things that the committee might do, I respectfully suggest, is ask if adequate measures have been taken to preserve these machines which may not now be in use so that they will be available in time of need.

Now I was very much impressed, too, with the statements of Mr. Pike and others, and I was very much impressed with the statement of Mr. Buschman and Mr. Shennan and others who testified.

Mr. Shennan said he heard expression from Defense officials and the top men here today "that go counter to our position."

Does anybody believe that these top officials would come up here and testify substantially contrary to the views here expressed if they who have the responsibility did not feel that they were the facts?

Mr. Shennan says "they are obviously prejudiced," and he says that "the lower levels are making policy." Well, I know that the lower

levels don't make policy in the Ordnance Department. It goes up to the highest trained ordnance men we have, the Ordnance Board, who take these new things and consider them, whether they are worth the use and how they can be made and how they can be transported, and all the other angles. And that is where policy is made, and I am sure Mr. Shennan was honest, but I can assure him that in the Ordnance Department policy is not made by the lower level. There is too much at stake, and the testimony alone of Mr. Ingraham that General Campbell flew to his plant to get him to make these devices in World War II is contrary to that point of view because General Campbell was the Chief of Ordnance, a very warm, good friend of mine, incidentally, and a fine citizen.

Now, gentlemen, the whole watch industry is now in a depression. These gentlemen have told you the sales are off. The figures will show you down at the Tariff Commission or at the Commerce Department that imports have dropped off 25 percent in the first 5 months of 1954. When the watch business goes down, when the domestic people suffer, the importers suffer, and if the trend this year keeps up it will be one of the smallest years of importations in many years. The reason for that is that there is a little bit of maybe oversupply due to the war in Korea and what not, of watches perhaps, and the other one is in anticipation of a tariff increase in watches. A lot of people bought a lot of them and they are stockpiled with movements now and the whole industry is bogged down accordingly.

I want to just stress a moment the skill. I concede the great skills in toolmaking which applies to the whole toolmaking industry, to jigs and dies, but once the machines, the tooling is set up, gentlemen, it is a mass production operation. Otherwise they could not turn out those thousands and millions of these things a day or a month.

Finally, what these gentlemen want are increased tariffs. I do not blame them for that. They want to make more money. They want to expand their business, they want to get all the market they can. But they have to fit this picture into the whole economy of this country. If this principle of picking out this one industry and cutting off our trade with the rest of the world were applied to the whole of America you would not ship any automobiles, you would not ship any steel, you would not ship any tobacco, you would not ship any cotton because they would not have the money to buy it with.

Trade is a two-way street. And in this particular instance with Switzerland it is all in our favor—$500 million more of our goods have the Swiss bought than we have bought of theirs during the 18 years of the Swiss trade agreement.

I have many other things here but I do not want to tire this committee. I have here a statement put out by the CIO from their headquarters opposing this whole transaction.

Why do you suppose these laboring men are in opposition to a curtailment of Swiss imports? Why? Because they know from looking at it, from a hard business standpoint, that they in America are profiting by this trade. They have got jobs that they would not otherwise have.

Senator DUFF. Would you desire to have this inserted in the record?

Mr. TYDINGS. Yes, sir; I would like to have it put in the record.

Senator DUFF. Very well, without objection, that will be made a part of the record.

(The document follows:)

[From News from CIO]

JUNE 30, 1954.

CIO ASKS PRESIDENT EISENHOWER REJECT TARIFF COMMISSION PROPOSAL INCREASE DUTIES ON IMPORTED SWISS WATCHES

CIO President Walter P. Reuther urgently appealed to President Eisenhower today to reject the United States Tariff Commission's recommendations for an increase in the tariff duty on imported Swiss watches.

Pointing out that the CIO has been a consistent and strong supporter of the reciprocal trade program from its very inception, Mr. Reuther urged that the United States not retreat from its well advanced position on international trade. He added that the security and well-being of America are dependent upon continued trade with free nations.

The CIO President's letter said that the imports of Swiss watches create a substantial amount of subsidiary employment in this country.

He pointed to the direct correlation between imports and exports, and said that more employment in the United States is dependent on continued American exports than would be adversely affected by increased imports.

At the same time, Mr. Reuther urged a reexamination of curtailment of defense orders in the watch industry; and serious consideration to an adjustment program such as the one recommended by the CIO over the years and spelled out by Mr. David J. McDonald, president of the United Steelworkers of America, CIO, and Public Member of the Randall Commission, in his dissent on adjustments in the trade and tariffs section of the report of the Commission.

Text of Mr. Reuther's letter follows:

"We urgently appeal to you to reject the United States Tariff Commission's recommendations for increasing the duties on the importation of Swiss watches.

"The Congress of Industrial Organizations has been a consistent and strong supporter of the reciprocal trade program from its very inception. It is important that the United States not retreat from its well-advanced position on international trade, because the security and well-being of America are dependent upon continued trade with free nations.

"The attitude of the United States toward the continued flow of trade among nations is significant to all the countries of the world. If the United States were to increase the duty on Swiss watches, as the Tariff Commission has recommended, the action would be interpreted by countries throughout the world as a first step in the return of the United States to its former protectionist position.

"We ask you to reject the Tariff Commission's recommendations for the following reasons:

"1. Imports of Swiss watches create a substantial amount of subsidiary employment in the United States. Roughly two-thirds of the watches imported from Switzerland come into this country in the form of watch movements, rather than assembled, completed watches. These watch movements must be assembled in American factories by American workers in American-made cases. In addition, a certain amount of processing, such as timing, regulation, and attaching bracelets and straps to the cases, is necessary before the watches can be sold as finished products in this country. These processes are domestic operations that supply jobs for American workers.

"2. Imports and exports are interdependent. More employment in the United States is dependent on continued American exports than would be adversely affected by increased imports. The watch industry is a very good example of this fact.

"3. The present economic recession or business downturn has temporarily affected both the United States production and the United States importation of watches. Reduced watch imports cause curtailed Swiss production and sales, which, in turn, mean that less United States wheat, lard, auto parts, machinery, et cetera will be exported to Switzerland. Increasing duties, as the United States Tariff Commission recommends, would further aggravate this problem.

"4. In recent years, the watch industry has been highly dependent upon defense orders for military timepieces, time fuses, et cetera. Although total employment in the watch industry today is greater than in any year since 1948, more than half of that employment is dependent upon defense orders. In 1949, less than 1 percent of the total employment was dependent on defense orders. The curtail-

ment of these orders would reduce employment considerably. However this situation cannot be remedied by imposing higher tariffs on Swiss watches. What is needed is a reexamination of the defense essentiality of items produced by watch plants.

"5. In order to continue favorable trade relations with Switzerland, as well as other countries, these countries must show a steady improvement in the economic status of their workers. Wage comparisons between countries and the effect of wage rates upon unit costs of production play an important part in trade relations. Any interference with the steady improvement of wages abroad will tend to make continued trade between the countries abroad and the United States extremely difficult. As long as the United States continues to import, the economic conditions of these countries will permit improvement in their workers' economic status through higher wages and improved conditions.

"If, on the other hand, tariffs and duties are increased as, in this instance, the Tariff Commission recommends for watches, the sales and production by other nations of the world will be curtailed. The needed improvement in their wage levels will be made extremely difficult, if not almost impossible.

"It is for these reasons that we recommend that you reject the United States Tariff Commission's recommendations to increase the duties upon Swiss watches. However, in the interest of the continuation of the reciprocal trade program, Mr. President, we urge that (1) the curtailment of defense orders to the watch industry be reexamined and (2) serious consideration be given to an adjustment program such as the one recommended by the CIO over the years and spelled out by Mr. David J. McDonald, president of the United Steelworkers of America, CIO, and public member of the Randall Commission, in his dissent on adjustments in the trade and tariffs section of the report of the Commission.

"Unless consideration is given to the specific problems of the watch industry and the long-run necessity of avoiding either the threat or the development of serious injury to various industries, the United States will be unable to retain its position, much less advance, in the field of international trade."

Mr. TYDINGS. When you can get these labor unions of the A. F. of L. and CIO both to favor some measure of world trade when their own jobs are at stake it is pretty good evidence that their bread and butter and the bread and butter of the United States is buttered on that side of the equation.

Gentlemen, I want to thank you. I want to say in conclusion that I hope nothing I have said reflects on my opponents here. I have met them in many places and they are a fine lot of patriots. They have made a great contribution to the war. Their industry should be kept alive, and I would be the last one to want to see it perish. I do not believe they are in the dire straits they think they are, and I believe that if they will look at the whole picture they will see that no one would be hurt more than themselves by taking harsh measures against a great little country that is contributing so much to the prosperity of the United States.

Thank you, gentlemen. If there are any questions I will be glad to answer them.

Senator DUFF. Thank you, Senator Tydings.

Senator Milton R. Young has submitted a statement which I should like to make a part of the record at this point.

(The statement follows:)

STATEMENT BY HON. MILTON R. YOUNG, JUNIOR SENATOR FROM NORTH DAKOTA

North Dakota, whose industry is basically agriculture, has recently opened a plant which comes within the scope of this hearing. Located at Rolla, N. Dak., is a jewel-bearing plant producing these very vital intricate mechanisms that are becoming more and more essential, not only to the watch and clock industry, but in the interests of national defense.

During World War II, this Nation was placed in a very precarious position in that jewel bearings were not produced in sufficient quantities domestically to meet the tremendous need to fulfill the requirements of our national-defense

program. We were dependent largely on imports from Switzerland, and if this supply had been cut off, it would have placed us in a most untenable situation.

Unquestionably the watch and clock industry in this Nation played an important role in not only bringing World War II to a successful conclusion, but in assisting our scientists in their work in the production of new and better instruments to be used in providing this Nation with a better national defense.

It is my opinion that every encouragement should be given to the leaders of this industry who have been farsighted enough to develop our domestic manufacturing facilities to the point they have attained today.

Again, in the interests of national defense, it is my opinion that no deterrent should be placed before them, as their continued technical knowledge will serve us well.

Many plants, such as the one I mentioned in North Dakota, have provided gainful employment to those living in remote areas, and this employment has done much to stabilize the economy of the communities involved. I am confident, Mr. Chairman, that you and the members of your committee will give the American watch and clock industry the consideration and recognition it deserves, with particular emphasis on the security of this Nation.

Senator DUFF. There is also a statement for the record by Congressman Dague from Pennsylvania, which will also be included in the record at this point, without objection.

(The statement follows:)

STATEMENT OF HON. PAUL B. DAGUE, REPRESENTATIVE OF THE NINTH DISTRICT OF PENNSYLVANIA

Mr. Chairman, I want to thank this subcommittee for the opportunity to be heard in support of our watch and clock industry and to offer this word in commendation of your approach to the problem presently confronting us in placing emphasis on the importance of retaining these skilled technicians as a vital adjunct to our program of defense.

The American industry has been fighting a rear-guard action with the advancing forces of a subsidized Swiss competition and we have seen 1 of the 3 jewelled watch factories in this country skirting the abyss of liquidation while the other two companies have resorted to various compromises in undertaking to stem the inroads made by foreign competitors who enjoy access to a labor pool which by our standards is ruinously underpaid.

In common with many other segments of our free-enterprise system we have had to wage constant warfare with our own Government over the past 20 years as it has continued to trade off our economic and industrials standards as a concession to the diplomatic demands made upon us by our so-called allies. We have seen the watch and clock industry used as pawns in the game of international chess and we have seen American workmen and investors constantly face up to ruin because some zealot for international goodwill has considered as expendable the welfare of a substantial group of our citizens. And the thing which fills us with frustration and resentment is the realization that such concessions have neither earned us friends abroad nor strengthened those whom we like to think of as allies against the common enemy. Indeed we might well take a page from the Swiss book and justify protection for American watches and clocks on the same grounds that the officials of Geneva have laid down an embargo on imported nylons in order to protect their own workmen.

The Hamilton Watch Co. located at Lancaster, Pa., in my congressional district stands as a monument to American ingenuity and a never-ending battle against economic odds. This great company has an unblemished record in three wars, having turned over all of its facilities to the Government for the production of Navy chronometers and other precision instruments. The irony of the situation, however, is found in the fact that while Hamilton was devoting all of its energies to the common cause the Swiss industry was literally "making hay" with the result that after each war was fought and won we found that we had lost, never to be recovered, a sizable part of our business to these opportunists.

In summation, then, while we may disregard the economics of the situation and even ignore the fact that we have been sacrificed on the altar of diplomatic expediency, we must not continue to remain blind to the vital necessity of protecting these strategic plants and their loyal and patriotic workmen as a military asset which may well spell the difference between victory and defeat should we again be called upon to defend our shores and our way of life.

If I may, I would like to commend to your attention an article written by Raymond Moley in the issue of Newsweek Magazine of February 22, 1954, in which he sets forth in detail the vital contribution made by Hamilton Watch. It occurs to me that Mr. Moley has given us a set of irrefutable arguments for extending protection to this important industry and the preservation of an irreplaceable corps of dedicated specialists.

[From Newsweek, February 22, 1954]

THE AMERICAN WATCH INDUSTRY

by Raymond Moley

The more sensational recommendation of the Randall report on foreign trade, to the effect that we should cut our tariffs, made the headlines. The reasoned conclusions in the same report, that we might well avoid undiscriminating cuts and that foreign barriers to trade should also be kept in mind when we indulge in international good will, received scant note. In short, since trade is a two-way street, the removal of restrictions should be a mutual matter. The case of one American industry which throws light upon this subject was presented to the Tariff Commission last week by the American Watch Manufacturers Association, which includes such familiar names as Elgin National, Hamilton, and Waltham.

For two decades these companies have been losing a battle of competition to the Swiss. Three factors, not at all related to their own efficiency, have handicapped them. Their costs have been pushed upward by the growth of organized labor. Free trade has been the spirit of the administration ever since the State Department in 1933 became dominant in making tariff policies. And military requirements during the second world war drastically limited American production of watches. Swiss watch movements had 65 percent of the American market in 1930. They now have 86 percent.

I have attempted to study this issue by firsthand observation of the Hamilton Watch Co., one of the few American companies still making jeweled movements of fine quality. Hamilton has a long and proud tradition. During the war the company was completely converted to military production. It turned out 10,000 Navy chronometers of an unexcelled quality—a larger number than had been produced by all the makers of the world in all history. Hamilton also produced many, many thousands of timing devices for shell fuses. Meanwhile, the Swiss made hay in the American market.

Walking through the factory recently, among the delicate machines and the veteran craftsmen, an executive remarked: "We will survive, even if we have to give up making movements and turn to making cases for imported Swiss products. But militarily that would be a national catastrophe."

It is nevertheless suggested by free traders that this industry should either be "mothballed" or channeled into other work through a paternalistic process of rehabilitation and retraining of its personnel. But workers with highly developed skill cannot be mothballed. Unless they continue their trade, their skill vanishes. A foreman at Hamilton says: "There are no other men in America who could come in here and do this work without years of training. It takes longer to train a real watchmaker than to educate a doctor or a lawyer."

A craftsman at Hamilton pays more of his wages in taxes than a Swiss craftsman earns. Moreover, Swiss workmen are in many cases working in their homes. Their product is channeled into trade through their government.

At the outbreak of the war Britain and France found that they had allowed their watch business to perish in the face of the government-subsidized Swiss and German industries. Britain managed to get timing fuses from us, but after the war both countries decided never to be caught in such a situation again. So they placed an embargo on watch imports and at great cost have rebuilt their own watch industries.

In 1951 our domestic watch industry appealed to the Tariff Commission for more protection, and they were granted an increase in tariffs. But President Truman, reflecting the preoccupation of the State Department with foreign trade, rejected the commission's recommendation. Since then, domestic production of watch movements has decreased 27 percent.

The most immediate and perhaps most appealing reason for keeping this industry alive is military security. But the lasting one concerns a choice between a reconversion which violates our American sense of the right to work and to choose

our occupation, and relief from devastating foreign competition. That choice faces the administration.

Senator DUFF. Senator Cooper, do you have any questions of Senator Tydings?

Senator COOPER. I think my question would more properly be directed toward the Defense Department.

In the letter which Senator Tydings submitted for the record from Senator Hunt's office, the Senator indicated that about 10 companies were engaged in the business of making mechanical fuses, and then in the memorandium from Senator Hunt it shows that 3 companies were making fuses at the rate of about 12 million a year. That is their capacity.

Do you have any comparable figures percentagewise as to what the total fuse production was and what percentage of the fuse production these other companies made?

Mr. TYDINGS. I do not have them, Senator, but I would most respectfully suggest that all of those things be gotten from the official records.

Senator COOPER. I suggest it should be on a comparative basis.

Mr. TYDINGS. That is an excellent thought.

I would like to reemphasize, Senator Duff, before you close the hearing, that the people I represent, the various companies, are not here in the interest of saving time. It would be repetitious. And I do not want it to be thought that I am the only witness on the other side.

Senator DUFF. We understand.

Is there anyone here who wants to say anything in rebuttal to what Senator Tydings has said?

TESTIMONY OF JOHN E. HARTSHORN, ESQ., COUNSEL FOR THE CLOCK MANUFACTURERS ASSOCIATION OF AMERICA, INC.

Mr. HARTSHORN. My name is John Hartshorn. I am counsel for the Clock Manufacturers Association. I am reluctant to inject myself into these proceedings, but in view of the fact that the Senator has introduced into the record the letter which he submitted to ODM, from which he read the George W. Borg statement, I would like to put in the record and have made a part of it the answer prepared by the Clock Manufacturers Association. Attached to it is a letter from the Borg products division, of the George W. Borg Corp. Incidentally, that is a clock company, a horological company, and what was said about it is, of course, true and helps to prove the essentiality of the horological industry.

Senator DUFF. Do you desire this to be made a part of the record?

Mr. HARTSHORN. Yes. I would like to read one statement from the letter which is attached. It is this:

> Our objections are to the obvious misstatements or misunderstanding as made in the report concerning the American horological industry and particularly to the statements made that concern the Borg products division of the George W. Borg Corp.

Mr. Chairman, that characterizes very well the entire statement submitted for the record by Mr. Tydings.

Senator DUFF. Leave it for the record. We will include the whole thing and, without objection, it will be admitted at this point.

Mr. HARTSHORN. All right, sir, thank you.

(The statement follows:)

CLOCK MANUFACTURERS ASSOCIATION OF AMERICA, INC.,
New Haven, Conn., June 7, 1954.

OFFICE OF DEFENSE MOBILIZATION,
Washington, D. C.

(Attention: Mr. John F. Hilliard, Deputy Assistant Director for Manpower.)

DEAR SIRS: In a letter dated March 24, 1954, addressed to the Office of Defense Mobilization, a group describing itself as American Watch Association asserted categorically that the American watch industry is not essential to the national defense. It attempted to substantiate this contention in an attached memorandum which purported to list alternate and adequate sources of mechanical time fuse production in the United States.

A careful analysis and investigation of the aforesaid documents has been made by the Clock Manufacturers Association of America, Inc., 4 of whose members manufacture 100 percent of the nonjeweled watches produced in the United States. It reveals the following:

1. Surprising lack of knowledge by the American Watch Association of the problems involved in the production of complicated mechanical timing mechanisms. It is of interest to note that the Benrus Watch Co., whose representatives obtained the information for the memorandum, have had a contract for simple fuse work terminated recently because of default.

2. The letter and memorandum of American Watch Association are filled with flagrant untruths, half truths, and misstatements of fact, as well as omitting important information bearing on the question of essentiality.

3. Representatives of the American Watch Association misrepresented their true purpose in obtaining data from which its letter and memorandum were prepared. This was done to secure statements which, taken out of text, convey entirely different impressions from those which the individuals interviewed intended to convey.

4. Information attributed to official sources listed by the American Watch Association was not, in numerous cases, obtained from authorized officials.

With a single exception, the American Watch Association consists of a group of importers of foreign-made watches, which has successively changed its name from "American Watch Importers Association" to "American Watch Assemblers Association" and finally to its present misnomer. It is hoped that this misnomer will be borne in mind so as not to confuse this association with the American watch industry.

We are keenly aware of the importance of the study which your committee has undertaken. Although it relates to the essentiality of the domestic jeweled watch industry, it cannot avoid directly affecting domestic producers of nonjeweled watches as well. In order that the information available for your inquiry may be complete, we attach hereto a memorandum which refutes and corrects the contents of the American Watch Association's letter and memorandum. We urge that it be given careful consideration by the Office of Defense Mobilization and your committee.

Sincerely yours,

JOSEPH T. INGRAHAM.

ANNEX TO LETTER DATED JUNE 7, 1954, FROM JOSEPH T. INGRAHAM, PRESIDENT, CLOCK MANUFACTURERS ASSOCIATION OF AMERICA, INC., TO THE OFFICE OF DEFENSE MOBILIZATION

In preparing the following analysis, representatives of Clock Manufacturers Association have either approached the listed companies directly or examined unclassified information contained in available files. Much additional, but classified, information is also available. It is suggested that inquiries at the Ordnance Ammunition Center at Joliet and at the procurement offices of each of the services will throw further light on this subject. Pertinent inquiries might be directed to the following, among other points: What proportion of total timing devices are furnished by the horological industry; whether the services have attempted to procure these items elsewhere; where procurement has been extended to nonhorological companies, whether they have been able to deliver the same high quality, low cost and large volume production which is typical of domestic clock and watch companies; where research and development contracts have been

awarded and what companies have made significant advances; and where the services can obtain quickly the large volume of timing devices needed in time of war.

The information set forth herein is limited to the mechanical time fuse program since the letter of the importer group was also limited. However, the essentiality of the domestic clock and watch industry is not thus limited.

We recognize that many excellent domestic manufacturers can achieve the type of defense production of domestic clock and watch companies—given time, facilities, equipment, and a pool of trained personnel. Lacking these, even a well-qualified company must fail to meet the needs of national defense for critical timing items where the shortest possible lead time is one of the most important factors.

Finally, it must be remembered that the essence of the essentiality to national defense of the clock and watch industry lies in its ability to design and engineer timing mechanisms, build the tools, produce the parts, and deliver quickly and in great and continuing volume. This ability is native to the clock and watch industry because of its day-to-day work in the field of civilian timing devices. It possesses the specially designed equipment and the unique skills of technicians who by continuous application over a long period of time have mastered the know-how of low-cost precision mass production.

EASTMAN KODAK COMPANY

The first company listed is Eastman Kodak Co., Rochester, N. Y., a manufacturer of cameras and photographic equipment. Since each camera contains a timing mechanism which controls the shutter on the lens, Eastman Kodak necessarily has much of the basic knowledge and skill which is unique to companies in the horological industry and is a logical supplemental source for timing devices.

The statements to "officials of the Eastman Kodak Co.," it has been learned, came from Mr. Green, general manager of the camera works and not from anyone with authority to speak for that company.

The letter states that the company operates "with complete independence and does not rely on the domestic watch companies for components, machinery, design, or assistance of any kind" and that "the only component purchased on the outside by Eastman Kodak is an escapement spring." This is not true. During World War II, the Eastman Kodak Co. participated in the mechanical time fuse program with the assistance of members of the domestic clock and watch industry. Today, even after more than 10 years of experience, the Eastman Kodak Co. still relies heavily on the domestic clock and watch industry for technical assistance and as recently as April 9, 1954, requested additional blueprints and technical advice from the industry. In the last 13 months, from April 1953, 1 company alone has furnished more than 30 different blueprints to Eastman Kodak as it sought to obtain volume production in the mechanical time fuse program.

During World War II two manufacturers in the domestic clock and pin-lever watch industry alone supplied Eastman Kodak Co. more than 17 million components, subassemblies, and parts. In the Korean defense program, Eastman purchased well over 1 million parts other than escapement springs from the domestic clock and watch industry, in addition to its reliance upon the industry for assistance in technical problems with which its engineers were not familiar. By contrast Eastman Kodak Co. has not supplied other fuse producers with any significant number of parts.

No unclassified information on the research and development projects now being pursued by the Eastman Kodak Co. is available, but clock and watch manufacturers actively participating in the defense program believe that no significant advancements in the mechanical time fuse program have resulted from these projects. Changes suggested by Eastman Kodak at meetings of the industry fuse integrating committee have proposed to downgrade specifications because the company had difficulty meeting the precision requirements in the manufacture of these horological products. Yet it would be expected that a company with 14 research and development projects would contribute the bulk of the advancements in the 500 series mechanical time fuse program. This has not been the case.

Although the number of employees in the camera works of Eastman Kodak is stated to be 12,000, there are only 6,000 and there were not 12,000 when the statement was made by the American Watch Association. Even with 6,000 employees the rate of production for defense by Eastman Kodak has been lower than that of clock and watch companies employing many fewer employees.

It is stated further that "the tool and die department at Eastman Kodak has in the past successfully made dies for fuse gear train and escapement gears and other small parts." The first die for escapement gear production at Eastman Kodak was made by a domestic clock and watch company. Since that time at least seven other escapement gear dies have been made by the Thomaston Special Tool Co. of Thomaston, Conn. (not in the Rochester, N. Y., area), which is operated by horological engineers trained and recruited from clock and watch companies and is thereby especially qualified to produce tools and dies for the fuse program. Eight dies normally would be *all* the dies needed by the entire industry for the production of this escapement gear. It is unlikely that Eastman Kodak has made dies for the escapement gear.

Another example of the reliance placed on this industry by Eastman Kodak is contained in a letter addressed to a domestic clock and watch company from Eastman Kodak dated December 6, 1951:

"Tom Gibbs tells me that you are also making No. 5 gears on a press. This is something I have wanted to try for 10 years, but our tool people say you can't do it. One of these days we are going to try it anyway, although for the present we are cutting them in stacks on Fellow straight line generators."

Making No. 5 gears on a press, while an extremely difficult operation, is far more economical and much faster than the method usually employed by companies outside the horological industry who do not utilize horological know-how.

Another example is contained in a letter from Eastman Kodak Co. to another manufacturer in the domestic clock and pin-lever watch industry:

"I was very much impressed by the scope of your operation and extremely well-organized and planned fuse assembly line. You and your staff can be proud of this operation.

"Needless to say, we all learned a great many things about fuse production which undoubtedly will help us improve our performance and reduce some of our difficulties."

Eastman Kodak is said to purchase escapement springs from a company not in the horological industry. These springs can be made by any company whose production is related to the manufacture of hairsprings, since the technically difficult process is in the preparation of the raw material. A tool shop with one machine can produce an enormous number of hairsprings in a very short time, and it would be uneconomical for each company to make its own hairsprings. The purchase from Windsor Co. (which, despite the reference to ping pong balls as its principal product, is operated by a competent tool designer qualified for escapement spring production) neither proves nor disproves any material fact on essentiality. Customarily this work, for reasons of economy, is not done by each producer. Borg Products Division of the George W. Borg Corp. and Westclox Division of General Time Corp., members of the domestic clock and watch industry, produce escapement springs for their own requirements and for others in the industry as well.

Eastman Kodak technical personnel readily admit lack of experience and skill in the production of many items requiring balance wheel escapements.

Eastman Kodak, a manufacturer of mechanical time fuses with a high degree of integration, has not been able to attain a sufficient rate of production to permit continuing delivery of a very substantial volume of mechanical time fuses. Its role is as an additional manufacturer not able to carry a greater part of the burden alone. An inquiry to the Department of Defense will show that the maximum production achieved by Eastman Kodak was far below scheduled rates of delivery until they were made more realistic and that production was achieved only after a very long lead time.

THE NATIONAL CASH REGISTER CO.

The second company listed by the importers is the National Cash Register Co. of Dayton, Ohio.

It is stated that National Cash Register "could again enter into production of complete fuses and fuse parts and would not be dependent in any respect on watch companies." It is further stated that during World War II his company manufactured within its own plant all parts for its fuses.

The National Cash Register Co. is not now participating in the mechanical time fuse program and has been out of that program for nearly 10 years. Thus, this company cannot be considered as a part of an immediately expansible base for the production of mechanical time fuses. It is a known fact that any com-

pany requires a very long lead time to begin production even if all machinery and equipment is made available. It is doubtful that National Cash Register now possesses the essential equipment and the necessary know-how, and it is altogether incorrect to say that National Cash Register was not dependent in any respect on watch companies during World War II, since more than 17 million subassemblies, components and parts were delivered to that company by domestic clock and watch companies for assembly. It must be concluded that even this company of acknowledged caliber does not have available the experience and facilities to be of immediate assistance. Tooling and developing would take too long in another emergency. Therefore, National Cash Register today is not properly includible in the mobilization base for mechanical time fuses or for other items requiring horological skill.

ECLIPSE MACHINE DIVISION, BENDIX AVIATION CORP.

The third alleged source of fuses is also a nonhorological company, Eclipse Machine Division of Bendix Aviation Corp., Elmira, N. Y.

It is stated that "Eclipse began to make mechanical time fuses, including all components and assemblies in 1939." This company under the direction of Frankford Arsenal was chosen with Hamilton, Waltham and New Haven to expand production of the mechanical time fuse, which, until that time, had been produced largely at the arsenal. After more than 2 years of working with the fuse, the Eclipse Division was able to reach a production rate of about 500 fuses a day, which is an insignificant volume. At no time during World War II did Eclipse produce fuses at a substantial rate, although eventually it assembled nearly 30,000 fuses a day after production of critical timing components was turned over to the horological industry.

Mr. Roy T. Hurley, chairman of the board and president of Curtiss-Wright Corp., who, during World War II, was vice president of Bendix Aviation and acting director of the fuse program at Eclipse Machine Division, has stated unequivocally that only after the fuse was turned over to the domestic clock and watch industry for redesigning was substantial production attained in this country. A copy of a letter from Mr. Hurley is attached as appendix A. He has stated also that within a year after assuming the task of developing volume production, the clock and watch companies made 365 changes in the design of the fuse and began large scale production. It was solely as a result of this redesigning that Eclipse was able to assemble fuses at a rate of nearly 30,000 a day from parts manufactured in the clock and watch industry. Three companies in the clock and watch industry furnished over 500 million subassemblies and components, including all of the critical timing parts, to Eclipse Division during World War II. The letter is false in stating that Eclipse Division's experience in World War II would permit it to resume fuse production at substantially any rate required by the Government."

The participation of Eclipse Division in the present fuse program has been limited to renovation of stockpiled fuses, but its continued reliance on the domestic clock and watch industry is readily apparent. More than 2½ million components and parts have been delivered for assembly from one company, alone, in the clock and watch industry. Eclipse clearly does not operate with complete independence as is stated by the watch importers.

Thus, Eclipse Division of Bendix Aviation Corp. lacks the background and experience needed to replace the facilities of the horological industry. It could not quickly develop an organization capable of producing horological devices because it does not have available the skills, experience or facilities necessary to such a program.

UNDERWOOD CORP.

The fourth company listed is the Underwood Corp. of Hartford, Conn. (Underwood-Elliot-Fisher Co.).

The facts stated are alleged to have been "obtained from officials of the Underwood Corp." It has been learned that the statements contained in the importers' letter do not represent the official position of that company and were not even made by officials of that company.

During World War II, the Underwood Corp. produced a fuse known as T-47, a point detonating device requiring little horological know-how. It was not a precision timing mechanism and was used for purposes differing from those performed by time fuses now in the M-500 series. Many excellent companies like Underwood, with precision skills, both in and out of the horological industry, made

this fuse in enormous quantities during World War II. Clock and watch experience, admittedly, is not necessary in the manufacture of this fuse.

No unclassified information is available on the "highly secret fuse" being manufactured by Underwood. It is believed that this fuse is not a high precision device intended to replace or supplant the M-500 series mechanical time fuse. Significant information can be obtained, however, from Frankford Arsenal on the difficulties experienced by Underwood and other companies outside the horological industry who have attempted with little success to manufacture this fuse.

Underwood has no experience in the manufacture of the horological defense items which the clock and watch industry is peculiarly able to manufacture quickly and in large quantities. It is not a readily available alternate source for these items.

KING-SEELEY CORP.

The fifth company listed is King-Seeley Corp. of Ann Arbor, Mich., a producer of timing devices with the basic knowledge and skills necessary to the production of mechanical time fuses. It is stated that this corporation has gone to watch manufacturers for a "few parts." This is false. Two companies in the clock and watch industry have furnished more than 13 million components and parts to King-Seeley, not including hairsprings delivered by the Borg Products Division. King-Seeley has, then, called upon the horological industry for far more than a "few parts."

King-Seeley does not have the capacity to produce a large volume of mechanical time fuses in an emergency; with its horological know-how it is a part of the mechanical time fuse base, but it is not now capable of the large volume production necessary to enable it to replace the domestic clock and watch industry in an emergency when there would be no time to build new facilities or train new personnel.

GIBBS MANUFACTURING & RESEARCH CORP.

The sixth company listed is Gibbs Manufacturing & Research Corp., Janesville, Wis.

The American Watch Association letter discusses the potential role of the "Gibb Co." As noted above, this company is, in fact, named Gibbs Manufacturing and Research Corp. This error is indicative of the careless manner with which the letter states "facts."

It is stated that the "Gibb Co." received a prime contract for 3½ million mechanical time fuses during the early part of the Korean war. In fact, the Gibbs Corp. is a small research organization with extremely limited capacities for production. At the time the contract was awarded, the Gibbs Corp. had available only 11,000 square feet of space and 60 employees, a large proportion of whom were engineers and not production men. It could not have performed the contract for 3½ million fuses in any reasonable period. This information was, of course, available to Government procurement officials. The contract was awarded to Gibbs only after arrangements had been made for Gruen Watch Co., an importer-assembler of watches, to assemble the fuse and for the E. Ingraham Co. to manufacture the timing components. Gibbs Corp. personnel undertook to supervise the assembly work at the Gruen Watch Co. as a part of its contribution to the performance of the contract. However, the Gibbs Corp. took no responsibility for and did not participate in any way in the performance by the E. Ingraham Co. of the production of the critical timing fuse parts.

In point of fact, the Gibbs Corp. was awarded this contract because Thomas Gibbs, its President, had long taken an active interest in mechanical time fuses. During World War II, he was a member of the industry fuse integrating committee while employed by the George W. Borg Corp. During the period 1946 to 1950, he retained his interest in this work through the research activities of his newly organized company which sought research and development work with the Government. The Gibbs Corp. could not have been awarded the contract without having available to it the facilities of other companies. This is a fact well known to the American Watch Association, one of whose members is Gruen Watch Co.

It is stated that "the company does not depend in any way on the domestic watch industry for any help in the manufacture of mechanical time fuses." This is a typical misleading statement. The Gibbs Corp. is no longer active in the mechanical time fuse program, and has resigned from the industry fuse integrating committee. Since the company has not produced any fuses during

the Korean war and is not now engaged in production, it is ridiculous to state that Gibbs does not depend on others for help in the manufacture of mechanical time fuses.

It is stated further that the Gibbs Corp. "starting from scratch, including making of all dies, fixtures, tools and gages" could be producing new fuses within 6 months. Gibbs Corp. itself has disclaimed and qualified this assertion. By a telegram dated April 8, 1954, the President of Gibbs Corp. stated:

"Reference letter addressed to officer of defense mobilization from American Watch Association, Inc., dated March 24, 1954, and signed by S. Ralph Lazarus, president. Statements of Gibbs officials referred to in above letter page 10 first and second paragraphs are not complete and require clarification as follows. Paragraph 1 page 10 must be qualified to the extent that the Government would furnish necessary priorities and/or make the necessary tools, fixtures, and gages available to Gibbs. This would be necessary in order for Gibbs to meet the delivery times as stated in paragraph 1. Paragraph 2 page 10 refers to chronometers provided Gibbs was given the required priorities, tooling, and engineering assistance by someone like yourselves who has successfully manufactured chronometers. Whether Gibbs could be in production within 6 months would depend upon factors not known at the present time. In spite of the fact that Gibbs could in our opinion satisfactorily produce chronometers we feel that Gibbs could contribute more valuable assistance to the Government in the time of an emergency by manufacturing in their normal field of electronics and mechanical instruments."

The Gibbs Corp. is a small organization built up by Mr. Thomas B. Gibbs, who has been a specialist in fuses for more than 10 years. His knowledge and that of his engineering department has been exceedingly valuable in the mechanical time fuse program in the past. However, the company is not a factor in the large volume, high quality, low cost production of mechanical time fuses.

THOMAS A. EDISON, INC.

The seventh company listed is Thomas A. Edison, Inc., of West Orange, N. J. In a letter dated April 26, 1954, Mr. Carl N. Milner, assistant to the president of Thomas A. Edison, Inc., made the following comment:

"The statement is made in the AWA presentation that information was obtained from past and present officials of Thomas A. Edison, Inc. To the best of my knowledge, no present employees of this company were contacted in connection with this survey, and all information given was obtained from Mr. William Wehrenberg, who was research director of the Special Products Division from 1946–50 and manager from 1950–52, but whose connection with this company ceased when we stopped the manufacture of mechanical time fuses."

Nonetheless, the importer group's letter professes to restate the views of present officials of the company.

It is stated that the "Thomas A. Edison Co. [sic] has had a great deal of experience in the production of M–43 fuses." It is stated further that during World War II, on instructions, the company purchased certain components, all from the Benrus Watch Co. This is false. During that period two companies in the clock and watch industry supplied more than 200 million parts to Thomas A. Edison, Inc., for its use in assembling mechanical time fuses.

The reference to the Benrus Watch Co. as "an importer of watch movements from Switzerland" is misleading. Prior to World War II, Benrus Watch Co. purchased a plant in Connecticut from the Waterbury Clock Co. and equipped it for the manufacture of watch cases and bracelets. During the war some equipment including screw machines and pinion cutting machines was in the plant. This equipment, which may have been owned by the Government, was removed after the war, and the company is no longer able to produce parts there. The plant is now used by many small companies in many different fields. Benrus, during the war, was not solely an importer of watch movements from Switzerland and should have been able to contribute to fuse production.

It is interesting to note that Mr. Atlas who has so cleverly misstated the true facts was employed at this Connecticut plant and should know the subject matter of the importer group's letter.

The information purporting to emanate from Thomas A. Edison was obtained from a former employee, a Mr. Wehrenberg, who was not with the company during World War II. He could not know the facts concerning Edison's participation in the fuse program during World War II, having been first employed on November 17, 1945.

As a matter of fact, Edison received its first contract with the Navy in 1940 for production of mechanical time fuses. It was more than 2 years before Edison was able to produce against its contract. And the plant capacity at Newark, N. J., where these fuses were manufactured was approximately 5,000 fuses per month, according to Mr. Wehrenberg. This insignificant capacity makes it clear that the Thomas A Edison Co. was not and is not now a factor in the production of mechanical time fuses.

Mr. Wehrenberg is alleged to have been in charge of the M–43 mechanical time fuse for Edison. This is false. Mr. Wehrenberg denies knowing anything about the M–43 mechanical time fuse. The fuses with which he was familiar during his limited experience at Edison were made for the Navy and then only in very small quantities. During the Korean war, the company again attempted with little success to deliver on fuse contracts. All production ceased in 1952, at the very height of the ammunition shortage. It is believed further that Edison worked on a research and development contract for 3 years without results. It can also be stated that Edison at no time was ever in volume production of mechanical time fuses.

The comments thus attributed to Edison were obtained from a former official whose qualifications and experience are apparently deliberately misstated and whose comments were not reported accurately. The record of Thomas A. Edison, Inc., in the mechanical time fuse program is not as is stated. It could not be at any time a significant factor in the production of mechanical time fuses with its present plant and without horological know-how.

GEORGE W. BORG CORP.

The eighth company listed is the George W. Borg Corp., Delavan, Wis.

It is stated that George W. Borg Corp. "is perhaps one of the most highly qualified corporations in the United States in the production of horological devices." This is true. The Borg Products Division of the George W. Borg Corp. is a manufacturer of horological devices. In fact, it is a member of Clock Manufacturers Association of America, Inc. This company is and has been an important part of the mechanical time fuse program, working closely with other companies in the horological industry. It is, perhaps, one of the most integrated plants now participating in the program. This, however, does not lend any support to the thesis of the importers.

There is attached hereto as appendix B a letter from Mr. L. M. Grether, vice president, restating the position of the George W. Borg Corp. It points up very clearly the deliberate misstatements made in the importers' letter. Even in the case of a company which does, in fact, contribute significantly to the fuse program, the importing group has deliberately twisted and misquoted statements made by the companies discussed, and has deduced opinions and statements of fact which are wholly false. The information cited was obtained by telephone by Mr. Atlas on the pretext of seeking other information, and the statements actually given him were altogether different when used in context.

It may be noted by way of contrast with the companies heretofore discussed that the Borg Products Division, being a horological company, has demonstrated its ability to develop quickly, large volume production of mechanical time fuses. During World War II, that company was able within a period of a few months to begin turning out large quantities of the T–48 mechanical time fuse, working in close cooperation with another domestic clock company. None of the nonhorological companies in this country could have produced so quickly and so well.

FRANKFORD ARSENAL

Frankford Arsenal, a Government-owned plant employing thousands of workers devoted solely to the manufacture of mechanical time fuses, has relied heavily on the domestic clock and watch industry in its mechanical time fuse program. As already noted, it was the horological industry which completely redesigned the fuse to make volume production feasible after Frankford Arsenal had spent many years on the project with little success.

The manner in which the importers obtained information from Frankford is again typical. The visitors from Benrus purported to be seeking ways of obtaining fuse contracts. The persons to whom they talked discussed this subject and did not, indeed, could not express the views of the arsenal or the Departments of the Army or Defense.

During World War II, two companies alone in the clock and watch industry manufactured more than 275 million components and parts and delivered them to Frankford Arsenal for assembly.

A number of companies are listed as being sources of supply to Frankford for various parts of the fuse. Significantly missing are the primary sources—all clock and watch companies. Nothing is said regarding the success of the arsenal in obtaining satisfactory quantities from the listed companies outside the horological industry. It is a fact that for critical plates the arsenal has now returned to the horological industry as its source of supply.

Of the additional sources listed most are either closely allied with or were developed by the domestic clock and watch industry. Many were suggested to Frankford Arsenal as possible subcontractors by the domestic clock and watch industry to expand the mobilization base. Despite this cooperation from the clock and watch industry, and even after many years of trying other sources, the arsenal still relies very heavily on the domestic clock and watch industry.

The Gruen Watch Co. is listed as a source of the No. 5 gear. This is erroneous. Gruen does not make this component and obtains it from the domestic clock and watch industry for its use in assembly of fuses.

It is suggested that an objective inquiry to the Chief of Ordnance and to Frankford Arsenal will confirm the outstanding contributions of the clock and watch industry to the mechanical time fuse program.

There is attached hereto a digest of testimony presented to the United States Tariff Commission by Lt. Gen. Levin Campbell, Chief of Ordnance during World War II, which also confirms the statements contained herein.

INTERNATIONAL BUSINESS MACHINES OF TORONTO, CANADA

As an additional source for mechanical time fuses, the importers' letter suggests International Business Machines in Toronto, Canada.

Little unclassified information is available on the production work done at the plant. However, it is apparent from the statements made by the importers that it was through the help of three domestic companies—Borg, a clock company; King-Seeley, a manufacturer of timing mechanisms; and Eastman Kodak, a maker of devices closely allied to horology with 10 years' experience in the fuse program—that the company was able to produce. Without this reservoir of skill and experience it is doubtful that IBM could have entered the program. In addition, the domestic jeweled-watch industry furnished many parts to this company which undoubtedly has helped it immeasurably in its production of fuses.

Further evidence of its reliance on the horological industry is to be found in the fact that timing, regulating, and testing equipment, essential to fuse production, was furnished to IBM by the George W. Borg Corp.—saving many months of time to that company in building its production.

If it is a fact that IBM produces only 1,000 fuses a day, it is clear that this company is at best only a supplementary source of fuses and cannot supplant existing sources in the clock and watch industry.

The foregoing analysis establishes beyond question that the nonhorological companies cited as alternative sources for mechanical time fuses cannot by any means constitute an adequate mobilization base. The primary source for timing mechanisms remains the clock and watch industry. Only in this industry is there available the necessary reserve of equipment, experience and skills to provide the vast quantities of timing mechanisms required in time of war.

Of the companies cited by the importers, Borg, Eastman Kodak, and King-Seeley, all experienced in the manufacture of timing mechanisms, are indeed sources of these items. They alone, however, cannot be the entire mobilization base. The remaining listed domestic companies are not now in the fuse program and are not, therefore, readily available sources—and would not be helpful in a sudden emergency. Frankford Arsenal, which developed the fuse, relies heavily on the clock and watch industry as full partners in the mechanical time fuse program. Moreover, the sources cited as supplemental are almost entirely supported by the existing clock and watch industry which supplies orders for horological products and trained persons to produce them.

In concluding, it may be reiterated that the essentiality of the domestic clock and watch industry lies in the ever-present store of trained management and skilled labor well able to advance rapidly the art and science of time as well as being capable of quickly producing high-precision timing mechanisms in large quantities. It is this unique contribution which cannot be replaced. To discard this potential is to invite tragic unpreparedness.

The industry invites a survey of its essentiality by a competent management engineering group capable of evaluating the statements contained herein and able to place the problem in its proper context.

APPENDIX A

CURTISS-WRIGHT CORP.,
Wood Ridge, N. J., April 14, 1954.

Mr. DUDLEY S. INGRAHAM,
The E. Ingraham Co.,
Bristol, Conn.

DEAR MR. INGRAHAM: I am pleased to furnish you with a letter setting forth my experience with the American watch manufacturing industry in the production of the M43 mechanical time fuse.

As you know, I was responsible for the production of this fuse at the Eclipse division of Bendix Aviation Corp., and I was also Chairman of the Fuse Integrating Committee during World War II, this being the first industry integrating committee that was formed to advance production and reduce costs. The mechanical time fuse as originally produced by Frankford Arsenal, due to the basic German design, was unsatisfactory from a production and an accuracy point of view, making it very difficult to produce the fuse in volume production. It was the horological know-how of the clock and watch industry that brought about the manufacturing redesign of the fuse using stamped gears, laminated plates, etc., making it possible to obtain the production essential for the defense of our country.

The large production of fuses at Eclipse was made possible by the production and tooling know-how of the horological industry and I doubt that the mechanical time fuse program would have been successful without the know-how and aid of this industry.

It is my firm opinion, based on my experience, that a strong watch manufacturing industry is essential to any national armament program of the future.

Sincerely yours,

ROY T. HURLEY.

APPENDIX B

BORG PRODUCTS DIVISION,
THE GEORGE W. BORG CORP.,
Delavan, Wis., April 5, 1954.

CUMMINGS, STANLEY, TRUITT & CROSS,
Washington, D. C.

(Attention Mr. John E. Hartshorn.)

DEAR MR. HARTSHORN: We take this means to express our objections to and to clarify, certain statements made in the report by the American Watch Association, Inc. to the Office of Defense Mobilization, on the date of March 24, 1954.

Our objections are to the obvious misstatements, or misunderstanding, as made in the report concerning the American horological industry and particularly to the statements made that concern the Borg products division of the George W. Borg Corp.

To my knowledge, no one in our organization has ever made the statement that we do produce, or desire to produce, all the parts for our production on mechanical time fuses, either in the so-called Korean war, or World War II. As a matter of fact, on all our fuse contracts we have relied heavily on the E. Ingraham Clock Co. for parts and components, as they are excellent mass producers and a very efficient and reliable prime contractor on fuses. It is true that we are not presently purchasing any parts from the jeweled watch manufacturers, but have called on them at times for help on parts on which we were short, at the time, and have always found them very cooperative.

The clock manufacturers in this country are equipped and capable of producing mechanical time fuses, without help from any source, as is the jeweled watch manufacturer. However, each of us may call on the others to supply certain parts and components to save time and tooling costs. By so doing, we are able to produce greater quantities of fuses and save the Government considerable sums of money in tooling and equipment costs.

We note, with interest, in the report that several companies have been suggested who could produce time fuses whose normal production is outside the horological industry. In every case where one of such firms have been awarded

a time fuse contract they found it necessary to call on the clock manufacturer, or jeweled watch manufacturer, for certain parts and components for which they were not equipped to produce.

It is natural to assume, if the horological industry must supply parts to such firms it would reduce the quantity of the end product which they would otherwise be able to turn out.

It is our opinion, and we have stated this many times to Government officials, that in an all-out war emergency the jeweled watch industry in this country, in their present size and capacity, would be many times too small to produce all the intricate time devices our country would need and for which they alone have the know-how, the equipment and the necessary skills to produce.

While we have no reason to believe that a reasonable amount of watch importation into this country is not a healthy condition, we do believe that we must encourage and expand our own jeweled watch industry for reasons stated before. You may quote us if desired.

Very truly yours,

L. M. GRETHER, *Vice President.*

DIGEST OF TESTIMONY OF LT. GEN. LEVIN H. CAMPBELL BEFORE THE UNITED STATES TARIFF COMMISSION, FEBRUARY 11, 1954

General Campbell testified that in the late thirties he was works manager for the Frankford Arsenal in Philadelphia and engaged, among other things, in the manufacture of the mechanical time fuse. Since the arsenals of the Ordnance Department handled only about 4 percent of necessary production, it was obvious to him that larger sources were necessary for the fuse. He thought of the watch and clock industry and went first to Westclox at La Salle, Ill., and got them interested in the problem. Since they manufactured alarm clocks and since the mechanical time fuse is an alarm clock set to go off at a certain time, he found Westclox was equipped with the necessary machine tools, equipment, and above all, know-how. He could find people to make precision parts but found it very difficult to find someone to make a timepiece which would operate after being expelled from a gun at 2,600 feet per second and spun at 16,000 revolutions per minute. Perhaps 18 months before the war started the arsenal interested a number of clock and watch companies in making the fuse and fuse parts which during the war were produced by the millions. Although he retired in 1946 as Chief of Ordnance, General Campbell understands that the mechanical time fuse has not been replaced and still is an important part of the ordnance picture.

General Campbell, together with Roy Hurley, who is now president of Curtiss-Wright, but who, during the war, was at Eclipse machine division of Bendix Aviation Corp., worked out an integrating program, received congressional approval, and, in effect, made one large mechanical time-fuse producing organization out of the clock and watch industry during the war. Based on his knowledge and experience, there was no other industry in the United States capable of so quickly producing a critical timing element of the mechanical time fuse.

General Campbell said that knowing the military policy of this country and knowing the impossibility of financing standby plants during peacetime, a going watch and clock industry equipped with necessary plants and know-how and trained people is a very great value to this country as a backlog and a safety for rapid reaching of production of the mechanical time fuse. He thinks that it would be very, very serious if this country were to face another emergency without the watch and clock industry because of the inability to obtain the necessary equipment quickly and to train people in a very short time.

Senator DUFF. Is there anybody else?

TESTIMONY OF PAUL MICKEY, ESQ., COUNSEL FOR HAMILTON WATCH CO. AND ELGIN NATIONAL WATCH CO., AND VICE PRESIDENT OF THE AMERICAN WATCH MANUFACTURERS ASSOCIATION

Mr. MICKEY. Mr. Chairman, there was another letter in answer to that which Senator Tydings put into the record, which was filed with the Office of Defense Mobilization by the American Watch Manu-

facturers Association, the jeweled watch group, and I would like to have that included as a part of the record.

Senator DUFF. Will you identify yourself for the record?

Mr. MICKEY. My name is Paul Mickey. I am counsel for the Hamilton Watch Co. and Elgin National Watch Co., and vice president of the American Watch Manufacturers Association.

Senator DUFF. Very well, without objection, that statement will be made a part of the record at this point.

(The statement referred to follows:)

AMERICAN WATCH MANUFACTURERS ASSOCIATION, INC.,
New York, N. Y., April 8, 1954.

Mr. JOHN F. HILLIARD,
Office of Defense Mobilization,
Washington 25, D. C.

DEAR MR. HILLIARD: Under date of March 24, the American Watch Association, Inc., through its president, Mr. S. Ralph Lazrus, addressed a letter to the Office of Defense Mobilization, and to your attention. The letter attempted to question the essentiality of the American jeweled watch industry to our national defense.

With the exception of the Bulova Watch Co., the members of that association are all exclusively importers of Swiss watches. Only Bulova manufactures watches in this country and, as you know, Bulova, which is also the largest importer, strongly believes that the maintenance of a domestic jeweled watch industry is a military necessity.

Much of the content and the entire spirit of the importers' communication represents either a reckless disregard of facts or a studied effort to mislead the Office of Defense Mobilization, and the other representatives of the United States Government who are serving on your interdepartmental committee. In our opinion, the statement is a clear attempt to mislead.

The statement filed by the importers demonstrates the type of competition which the domestic watch industry faces and the lengths to which the importers are willing to go. We are familiar with this type of activity from long past experience, and we trust that this unfortunate document will give you some idea of the tactics of confusion which always have been employed. It should show how little concern the importers have for the national interest. It reflects their willingness to change their opinions and convictions according to the purposes to be served; it contains purported statements by unnamed individuals which are alleged to reflect the position of certain companies outside of the watch industry and of the United States Government arsenal at Philadelphia, Pa., which in general have been distorted to convey a false impression; it contains untruths and half-truths, arranged and presented in such a manner as to give impressions which the importers know, or ought to know, are erroneous.

The letter of the importers denies that there are any skills peculiar to the watch industry and says that all that is required to make jeweled watches is certain precision machinery, highly skilled labor, and experience. Obviously these are the requirements, but they are stated here in a manner and context calculated to give the impression that all these things are available elsewhere than in the jeweled watch industry and can be readily obtained, both as to timepieces and other work, especially military time fuses.

The importers well know that the establishment of watchmaking capacity is an extremely difficult and expensive process, requiring a period of years. The only member of the importers' association which has established facilities for production of watches in the United States, the Bulova Watch Co., has publicly stated, on numerous occasions, that, even with the ability which it had at that time to obtain machinery and technical assistance from Switzerland, and even with the help afforded by its own plants in Switzerland, it required 10 years to establish production in this country.

The weight which should be given to the assertions and the inferences that the facilities and skills of the jeweled watch industry are readily available elsewhere, can best be judged in the light of the contrary statement which Mr. Lazrus made while being examined under oath before the United States Tariff Commission on February 12, 1954:

"Mr. COLBURN. Now why don't you go into the manufacturing business, Mr. Lazrus?

"Mr. LAZRUS. Because none of the facilities are available to me. If I lived in Switzerland (and there was talk here of being in the manufacturing business in Switzerland) and I went into business, I would have available to me all of the engineers that graduate from I don't know how many schools in Switzerland and all the machinery and everything else that is in that country.

"They may not export it to America, and I don't blame them for trying to protect their interests, but I can't do that in America. How much help could I get from Elgin, how much from Waltham or Bulova if I tried to do that here?"

Throughout his testimony, Mr. Lazrus continued in strong terms to make the point that he could get the facilities needed for the watch business only from Switzerland or the domestic companies—Bulova, Elgin, Hamilton, or Waltham. He did not mention any other possible source of assistance.

The domestic jeweled watch industry does not contend, and has never contended, that it is impossible for any company, not now producing watches, to make jeweled watches of quality. It knows, however, as does any person acquainted with the facts, that any new producer would require years to get into volume production. Statements calculated to give the impression that such facilities could be created quickly in event of war are untrue and are a distinct disservice to your study and to the Nation.

Under the heading "Skills Found in Watch Manufacturing Are Precision Skills, Not Watchmaking Skills, and Are Found in Several Related Industries Using Precision Equipment," the importers' letter says that nine listed companies, none of which now produce or have ever produced jeweled watch movements "are in a position to produce for the defense of the United States all types of material which can be produced in the watch industry." The letter attributes to 4 unidentified officials of 4 of the companies' statements that their companies could make precision chronometers. It is reported that two of these officials stated that they could do so within 6 months.

Only one company in the United States has ever produced marine chronometers for military use in the United States. This was done under wartime pressures by Hamilton Watch Co. Hamilton required 18 months to get into volume production. Although currently producing small quantities of chronometers, Hamilton estimates that it would require at least 9 months lead time to reestablish mass production. Late in World War II, the Elgin National Watch Co. was requested by the Government to establish production of chronometers as an alternative source and by the end of the war was ready to produce.

The discussion of the capabilities of the nine listed companies ranges from production of mechanical time fuses to chronometers, but the general discussions of their facilities and skills is confused to give the impression that each and all of them is capable of manufacturing any of these items. Some of the nine companies have contracts to supply the mechanical time fuse series M–500 and nothing more. None of the listed companies manufactures all of the parts it uses. All of them buy parts from the domestic jeweled watch industry or the domestic clock industry. At least one and probably several buy parts from the Swiss watch industry. Several of them have not been used in the fuse program since World War II, during which period they were obtaining a tremendous quantity, if not the majority of parts from the watch and clock industry. One company, which tried to perform without substantial help from the horological industry, has had a contract canceled for nonperformance.

The jeweled watch industry does not contend that it is impossible for any other company to produce fuses, given time, machinery, tools, and engineering assistance. We know that other companies have had contracts to supply fuses, and that several of them could, if they chose and if the economies of time and money permitted, produce all of their parts. However, to imply that these companies have achieved production without assistance from the watch industry and that they have adequate capacity to supply the requirements for fuses is entirely misleading. To say that they are producing without assistance of the watch industry, even in the present limited emergency, is false.

The extent to which these producers have obtained help from the watch and clock industry, both here and in Switzerland, the amount of work which they have actually subcontracted, and the length of time which they required to get into production, are not factually treated.

To illustrate the errors of fact contained in the statements attributed to representatives of the nine listed companies, we will match some of the statements respecting the alleged independence of these companies with material from our files:

At page 3, paragraph 2, of his letter, Mr. Lazrus states: "Eastman Kodak Co. operates in the Rochester area with complete independence and does not rely on the domestic watch companies for components * * *" We do not believe that any responsible official of Eastman ever made such a statement. The fact is that the domestic jeweled watch manufacturers have furnished Eastman 5,800,000 escapement springs, 8,281,000 pinions, 400,000 arbors, and 2,282,000 adjusting screws since 1950. We will be glad to substantiate these figures with copies of the purchase orders, if desired.

At page 4, paragraph 1, Mr. Lazrus states: "It is interesting to note that the only component purchased on the outside by Eastman Kodak is an escapement spring of the type normally supplied by domestic watch companies. However, Eastman Kodak purchases this part from a company in Clifton, N. J., whose main business, operated under the name Windsor Manufacturing Co., is a manufacturer of ping-pong balls." This statement is untrue as shown by the information above.

At page 17, paragraph 3, Mr. Lazrus states: "* * * but in no case was IBM supplied with parts by a United States jeweled watch company." At least 2 and perhaps 3 of the 4 domestic jeweled watch companies have recently furnished parts to IBM, including gear and pinion assemblies, adjusting screws, and escapement arbors.

At page 18, paragraph 1, speaking of IBM, Mr. Lazrus states: "They advised that they did not need the help of the American jeweled watch industry in order to make the fuse, nor did they have occasion to call upon them." The falsity of this statement is indicated by the information above and, in addition, is demonstrated by letters from IBM which we have, and will be glad to supply if desired.

At page 10, paragraph 1, Mr. Lazrus states that: "Gibbs officials stated that, starting from scratch, including making of all dies, fixtures, tools and gages, they could be producing new fuses within 6 months." In a telegram dated April 8, 1954, Mr. Thomas B. Gibbs, president of the Gibbs Manufacturing & Research Corp., stated: "Paragraph 1, page 10 must be qualified to the extent that the Government would furnish necessary priorities and/or make the necessary tools, fixtures, and gages available to Gibbs. This would be necessary in order for Gibbs to meet the delivery times as stated in paragraph 1."

In Mr. Lazrus' statement he implied that King-Seeley Corp., the Eclipse Machine Division of Bendix, Thomas A. Edison Co., and National Cash Register Co. were completely independent of the watch industry during World War II. The fact is that they were highly dependent upon the watch industry, and also upon the clock industry. Mr. Dudley Ingraham, president of Ingraham Watch Co., testified at the recent tariff hearings that "all of those people took these timing parts made in the horological industry and assembled them into the complete fuses." In addition, during the current fuse program parts have been sold to all of these companies by the domestic jeweled watch industry and, undoubtedly, also by the clock industry.

On page 13, The George W. Borg Corp. is represented by Mr. Lazrus as "perhaps one of the most highly qualified corporations in the United States for the production of horological devices." We agree that, of the 9 companies listed, Borg is 1 of the most highly qualified. We attach a photostatic copy of a letter on the subject of Mr. Lazrus' representations, from the vice president of Borg. We call your particular attention to the second paragraph on page 2 of his letter.

Another company cited as authority by Mr. Lazrus is the Underwood Corp. In response to an inquiry concerning the statements attributed to Underwood, the president of that company, Mr. L. C. Stowell, states that the material attributed to Underwood—

"poses quite a mystery to the executives of Underwood Corp. We have checked with the vice president who handles our defense contracts and our Hartford work, and not only can we find no one who made such statements as are attributed to us, but neither the work manager nor the man in charge of our defense work at Hartford has any recollection of a person or delegation ever coming to see us to ask any type of questions about the watchmakers' art.

"Not being able to unearth any direct information on this subject indicates to me a lack of any official Underwood connection with the report."

All of the above information demonstrates the unreliability of the importers' letter. Additional similar information can, no doubt, be obtained if desired.

It is indeed unfortunate that what is supposed to be an accurate appraisal of a national security problem should be confused—apparently intentionally—by the misleading reports and assertions which have been advanced. The letter

to you has been widely circulated to officials in the Government. In addition, on Tuesday, April 6, all of the material from page 3 through page 18 was placed in the Congressional Record by Senator Hunt, of Wyoming, and it appears there in a manner which leaves the impression that the material originated in the Department of Defense. We do not believe that Senator Hunt knew its origin, and we believe he should be advised of the facts. The entire matter has been the subject of a press release by the importers' association, and will be used by their public-relations firm and probably by the public-relations firm which represents the watchmakers of Switzerland. We would have much preferred that this important problem should be answered in an orderly manner by your study.

The reasons for the importers' interest in your study are quite obvious. They themselves have no facilities for production of watches in the United States. They are interested only in establishing that the facilities of the domestic producers are not essential and need not be preserved for the security of the country. This is the whole spirit of their letter to you. In this connection, we call your attention to the fact that in May of 1953, a representative of the importers' association, Mr. Millard Tydings, stated to the Ways and Means Committee of the House of Representatives: "We agree with all concerned that the jeweled watch industry is essential to the security of the Nation in wartime." This statement cannot be reconciled with the position taken in their letter of March 24. Considered together, they demonstrate that the importers' approach to this important question is simply one of expediency.

We feel confident that this attempt to mislead you will not interfere with your study of the problem.

Respectfully,

PAUL MICKEY, *Vice President.*

BORG PRODUCTS DIVISION,
THE GEORGE W. BORG CORP.,
Delavan, Wis., April 5, 1954.

CUMMINGS, STANLEY, TRUITT & CROSS,
Washington, D. C.

(Attention, Mr. John E. Hartshorn)

DEAR MR. HARTSHORN: We take this means to express our objections to and to clarify, certain statements made in the report by the American Watch Association, Inc. to the Office of Defense Mobilization, on the date of March 24, 1954.

Our objections are to the obvious misstatements, or misunderstanding, as made in the report concerning the American horological industry and particularly to the statements made that concern the Borg Products Division of the George W. Borg Corp.

To my knowledge, no one in our organization has ever made the statement that we do produce, or desire to produce, all the parts for our production on mechanical time fuses, either in the so-called Korean war, or World War II. As a matter of fact, on all our fuse contracts we have relied heavily on the E. Ingraham Clock Co. for parts and components, as they are excellent mass producers and a very efficient and reliable prime contractor on fuses. It is true that we are not presently purchasing any parts from the jeweled watch manufacturers, but have called on them at times for help on parts on which we were short, at the time, and have always found them very cooperative.

The clock manufacturers in this country are equipped and capable of producing mechanical time fuses, without help from any source, as is the jeweled watch manufacturer. However, each of us may call on the others to supply certain parts and components to save time and tooling costs. By so doing, we are able to produce greater quantities of fuses and save the Government considerable sums of money in tooling and equipment costs.

We note, with interest, in the report that several companies have been suggested who could produce time fuses whose normal production is outside the horological industry. In every case where one of such firms have been awarded a time fuse contract they found it necessary to call on the clock manufacturer, or jeweled watch manufacturer, for certain parts and components for which they were not equipped to produce.

It is natural to assume, if the horological industry must supply parts to such firms it would reduce the quantity of the end product which they would otherwise be able to turn out.

It is our opinion, and we have stated this many times to Government officials, that in an all-out war emergency the jeweled watch industry in this country, in their present size and capacity, would be many times too small to produce all the intricate time devices our country would need and for which they alone have the know-how, the equipment, and the necessary skills to produce.

While we have no reason to believe that a reasonable amount of watch importation into this country is not a healthy condition, we do believe that we must encourage and expand our own jeweled-watch industry for reasons stated before. You may quote us if desired.

Very truly yours,

L. M. GRETHER, *Vice President.*

Senator DUFF. Is there anyone further who desires to be heard?

Mr. MICKEY. May I make one remark?

Senator DUFF. Yes, sir.

Mr. MICKEY. I would like to make a statement in answer to the question I believe Senator Cooper asked in relation to the imports of watches other than watches containing more than 17 jewels.

Senator COOPER. Yes, I asked Senator Tydings that question earlier in the inquiry.

Mr. MICKEY. I would like to have the record show that the imports of watches containing 17 jewels and less in 1951 were 9,128,000; in 1952 they were 9,187,000; and in 1953 they were 10,615,000. During that same period there were domestically produced in 1951 3,161,000; in 1952, 2,480,000; in 1953, 2,237,000; and for 1954 the budgeted production of the 4 companies is 1,678,000.

Also during that same period in 1951 there were employed 8,151 workers in the production of jeweled watches in this country; in 1952 there were only 6,800; in 1953 there were 6,670; and in 1954, today, there are 4,300 or less. During the period from the end of 1951 to the present time both employment and production have dropped 50 percent.

Mr. TYDINGS. I would like to make a rejoinder to that. Of course, these companies then had moved over into making fuses, which they have already explained, and neglected—it was very commendable patriotism—to keep up the full production of watches because obviously they themselves have said they took their skilled workers to do this work. That has happened in World War II. There was a drop and then they come up after the war is over. It takes a little while to get it back. But it would be unfair to take their war years when they themselves were doing so much for the company as a yardstick of what might be called normal times.

Senator DUFF. Mr. Bulova, do you have a statement to make?

STATEMENT OF ARDE BULOVA, CHAIRMAN OF THE BOARD, BULOVA WATCH CO.

Mr. BULOVA. Yes, I would like to answer that in regard to the war work it was not a question of whether the domestic manufacturer had the choice of making or not making watches; it was a question of whether it was economically sound to make them. And with the increased cost of labor in this country it is becoming economically unsound to make them. We have reduced our production down to about 350,000 per year in our production here in the States, and we are importing close to 2 million from our plants in Switzerland because it is good business to do so. And with that 350,000 domestic production we

have 75 percent of our overhead charged to our Government operations.

Now it is not a question of whether the watch companies in this country can make a profit, and I am not down in this hearing before you on a question of economics. They are all capable organizations. They are capable of manufacturing many things. We have expanded into other products ourselves. But the question is, the entire question remains, as Dr. Flemming, in his testimony, pointed out, that this country must have a healthy domestic watch-making industry so that skills will be available. He said the industry must be healthy enough to continue to attract new blood to be trained to these skills. As the old ones leave you have got to replace them. Otherwise you will not have a watch industry.

The only reason I am here is because I felt it was my duty to express these facts. We have watch manufacturing facilities in Europe to take care of all our requirements. Aside from the national security question, no other issue is relevant to this discussion.

The suggestion this morning in the New York Times that more defense work might be given to the watch companies to keep them going, completely ignores the prime issue. Unless watch companies are enabled to make watches continuously they cannot be expected to keep their skills at peak ability, nor to get new skilled people to come in this field and develop. The fact that watch companies are making money on other products, war work, imported movements, does not help this fundamental requirement for national defense, the skills that must be maintained in the actual putting through of watches and watch parts. Watch companies that are making money on other products and defense work are not making watches and, so, are not contributing to national defense.

As to the matter of stockpiling jewels, this has been an issue, and I recommended it in World War II. They did stockpile jewels. But with the redesign of instruments and measuring devices, the jewels were obsolete. You could not use them. New ones had to be made. New designs require new types of jeweling, and therefore the stockpiling, the greatest percentage of stockpiled jewels was unusable. So the stockpile we carried over from World War II proved to be no good when we came down to Korea. We could not use them.

Since plants in this country are necessary to make jewels we naturally need people to supervise and staff them. Only watch companies can supply this talent, and that is all there is to that. I think the evidence that was produced here shows that we are not too different in the horological industry from the clock industry who showed an exhibit of the things they made. We perhaps in the jeweled watch segment have gone down to the miniaturization of instruments that have been used in guided missiles and other products. That is the only reason that brings me here. It is not a question of economics.

Mr. TYDINGS. I want to close my side of the case by pointing out that there can be no question that people who have never made watches have made these time fuses in great numbers, and the evidence is from the War Department. This is the best evidence.

Senator DUFF. Does anybody else have anything to say?

Mr. MICKEY. May I say this on the jewel bearing question: Here is a document summarizing it. This is from a report of the War Production Board during World War II, and summarizes all of the facts

of the jewel bearing problem as it confronted the country at that time, and I would like to have it included as a part of the record.

Senator DUFF. Very well, without objection, that may be done.

(The document follows:)

THE JEWEL-BEARING PROBLEM: A RÉSUMÉ OF THE KEY IMPORTANCE OF THE DOMESTIC JEWELED-WATCH INDUSTRY TO ESSENTIAL UNITED STATES PRODUCTION OF JEWEL BEARINGS FOR FULL MOBILIZATION

SYNOPSIS

Most of the implements of war, aircraft, ships, tanks, and guided missiles depend for successful operation on precision instruments. Essential to precision instrumentation is the jewel bearing. Jewel bearings are tiny synthetic sapphires, rubies, or garnets used to provide a surface against which the moving parts of an instrument can turn with a minimum of friction, vibration, and wear. Finished and shaped to within hundreds of thousandths of an inch, these tiny stones must sometimes withstand pressures of as much as 20 tons per square inch. Thousands of tiny bearings made and finished with unbelievable accuracy are required for the instruments used in every plane, every ship, every tank, every guided missile.

Switzerland, prior to World War II, was the only source of jewel bearings—there being no domestic jewel bearing industry. At the outset of the war, Switzerland was encircled by the Germans and the United States awoke to the fact that if it was to mechanize its armed services, a ready source of jewel bearings must be found. The Government turned to the domestic jeweled watch industry for help, for only this industry contained the reservoir of skills and manpower necessary to implement a jewel bearing program. Although hindered by shortsighted and unrealistic Governmental policy and vascillating demands, the domestic jeweled watch industry responded and a domestic jewel bearing industry was born. Not only did the industry produce large quantities of jewel bearings, design and produce its own machines for doing so, but it also constructed machines and gave technical assistance in establishing production lines and methods for other producers. This undertaking was made possible only because the domestic jeweled watch companies had available men skilled in the precision work required.

The official planning for jewel bearing production came so late that, despite the efforts of the watch companies, imports still furnished the major source of supply. These imports were smuggled out of Switzerland and probably would not be available in another full mobilization.

The end of hostilities signaled the death of the infant jewel bearing industry, for it could not compete with Swiss bearings made by cheap labor. The cold war, however, stimulated renewed armed-services interest in a domestic jewel bearing industry. Once again threats of being cut off from imports of Swiss bearings spurred Government efforts to develop this industry and again the domestic jeweled watch industry was called upon for help. Under an Army ordnance contract, the Bulova Watch Co. has established a facility at Rolla, N. Dak., for the production of jewel bearings, drawing upon Indians resident in the area for manpower to be trained in the required skill. Under an Air Force contract the Elgin National Watch Co. has developed new machines and production methods for jewel bearing manufacture in a prototype production line capable of vastly increased production per worker.

These projects of the jeweled watch companies, sponsored by the armed services, show that American production-line methods of making jewel bearings are feasible and that pilot lines with a reserve of skilled workers can be built, and with proper planning, expanded to needed capacity in the event the world conflict closes the door on imports of jewel bearings. To avoid the crippling effect of a sudden shortage of jewel bearings, however, it will be necessary to maintain an adequate reserve of machines and trained personnel to man and maintain them and to train additional workers. This objective requires the existence of the domestic jeweled watch industry as the nucleus for expanding the present domestic jewel bearing production projects when the time comes.

INTRODUCTION

This paper considers the importance of jewel bearings to the Nation's industrial and military potential; the sources of these bearings in wartime; and the present state of preparedness of the Nation for this critical item. It

recommends a policy of Government action to provide for the Nation's needs in the event of full mobilization.

THE NATURE AND USES OF JEWEL BEARINGS

Jewel bearings are essential to the operation of precision instruments. They have been indispensable in precision timekeeping devices for many years. Before 1940, the use of jewel bearings in electrical measuring instruments had also become traditional. A trend to increased instrumentation of military materiel began in World War II and has grown apace since then. Precision instruments for ships, tanks, planes, fire control gear, guided missiles, and other war materiel demand jewel bearings for dependable operation. Jewel bearings are also widely used in gages and precision industrial measuring devices of all types.

Jewel bearings are tiny synthetic sapphires, rubies, or garnets, often smaller than a grain of sand, which are shaped, polished, drilled, cupped, or otherwise formed to accommodate their intended function. The principal function of the bearing is to provide a surface against which the moving parts of the instrument can turn with a minimum of friction, vibration, and wear under varying extremes of temperature. They are also used as contact points in precision gages where the slightest wear would affect the accuracy of the instrument.

The shaping and polishing operations of jewel bearings must be performed within extremely close tolerances, usually in the order of ten one-thousandths of an inch, though often they must be held to hundreds of thousandths of an inch. These bearings must be capable of withstanding great pressures. The sharp point of a pivot resting against the bearing may result in pressure of as much as 20 tons per square inch being exerted on the bearing. The raw material for jewel bearings is generally synthetic sapphire. This is made from alumina which under intense heat acquires the physical and chemical properties of natural stones. As many as 60 operations are required in the traditional method of producing jewel bearings from the formation of the crude synthetic jewel in the intense heat of the furnace through the preparation of the jewel blanks to the final polishing, shaping, cutting, drilling, and mounting.

The manufacture of jewel bearings involves meticulous detail. The work must be done exactly the same each time and must be continually checked. Because of the very tiny dimensions involved in the production, the production of jewel bearings is a difficult operation. Wear on the tools is as great as wear on the material and adjustments are constantly required which make the use of fully automatic equipment difficult. The diamond abrasives used in the process and the sapphire dust wear everything contacted. Small tools, such as tweezers, must be constantly refinished and replaced. Machine chucks are difficult to keep in shape. The diamond and sapphire powders have disastrous effects upon machinery bearings. Care and execution of extreme cleanliness and orderliness in working operations are essential. (These are all attributes of domestic jewel watch manufacture.)

SOURCES OF JEWEL BEARINGS

Pre-World War II

Prior to World War II only a small part of United States demand for jewel bearings was produced in this country. The majority of the jewels were made in Switzerland. The American industry was unable to compete pricewise with the Swiss who operated with much lower labor costs. During the period 1936 to 1940, the average yearly imports of jewel bearings for United States consumption were approximately 64 million.

World War II

With the fall of France in June 1940, Switzerland was virtually cut off from the rest of the world. Their exports had to be sent across occupied territory. The German Government compelled Swiss exporters to secure transit permits. Though permits were promptly sought, the German consul at Berne refused to issue them. Like the United States, Great Britain had no domestic industry to speak of, and the critical situation created by the lack of jewel bearings for instrument manufacture in Great Britain resulted in appeals to the United States to supply British manufacturers with many thousands of jewel bearings each week. This development alerted the United States to the threat to its own precision instrument manufacturing operations in the event it became involved in a war.

EFFORTS BY THE UNITED STATES IN WORLD WAR II TO CREATE A DOMESTIC INDUSTRY TO SUPPLY ESSENTIAL MILITARY NEEDS

Prior to United States entry into the war

Government action in the United States to provide against the threatened loss of jewel bearing imports by creating adequate domestic capacity to supply essential defense needs was now quickly considered, but proved to be erratic and unrealistic.

In October 1940, the United States National Defense Council considered the threatened loss of jewel bearings to the United States. The council appointed a technical advisor to study the matter. After an extensive inquiry into the situation, the council's advisor concluded that domestic jewel bearing manufacturing plants of substantial magnitude would have to be established if the United States was to be assured of adequate supplies of jewel bearings for the watchmaking, electrical, and instrument industries. In December 1940, the Army-Navy Munitions Board stated that it deemed the establishment of a jewel-bearing cutting industry in the United States advisable in order to make us independent of Swiss sources of supply.

In May 1941, the Munitions Board recommended the establishment of a pilot plant partially financed by the Government to develop, modify, and improve the machinery required in jewel bearing manufacture. The Office of Production Management concurred in the recommendation. The Reconstruction Finance Corporation surveyed the situation, however, and persuaded the Munitions Board to withdraw its recommendation. Less than a week later Germany forbade the Swiss to ship jewel bearings to the United States. Swiss postal authorities placed rigid restrictions on packages containing merchandise. Shipments originating in Switzerland were subjected to rigid inspection by German and Italian authorities. On August 28, 1941, jewel bearings were designated a critical material by Under Secretary of War Patterson and Under Secretary of the Navy Forrestal.

In October 1941 Under Secretary of War Patterson asked the Defense Plant Corporation to order from Bulova 10 sets of jewel manufacturing machinery. Each set was to be capable of producing 2,000 jewels a day, and Bulova was asked to train an adequate number of employees of each defense contractor purchasing its equipment.

After United States entry into the war

The Government soon realized after Pearl Harbor that jewel bearings were indeed critical to the war effort. Conservation Order M–50 was issued January 14, 1942, placing jewel bearings under complete allocation. Shortly thereafter, military requirements for jewel bearings increased to such an extent that the order was amended to extend the period of conservation indefinitely.

Under the lash of war requirements the Government's policy became for a time one of full steam ahead to create and bring a domestic jewel bearing industry into large-scale production. The execution of that policy, however, suffered from inadequate advance planning as well as an utter lack of realism in the estimation of requirements and the scheduling of production. The situation is described, in part, by the History of Jewel Bearings, prepared by the jewel bearings section, War Production Board, as follows:

"The domestic facilities were planned and built to supply ultimately all military jewels for instruments and to provide the watch jewels necessary to supplement watch manufacturers' stocks. Such was the intention. It was founded on guesswork and tempered with a lot of common judgment, for military requirements were impossible to determine at first * * * almost as soon as requirements were figured out for one program, a revision would appear, and the figuring would begin all over again. Facilities which were planned to supply 1.5 million instrument rings, 1 million vees (40 percent to be sapphire and 60 percent to be glass), and 700,000 watch jewels per month had to be revised before they reached their maximum capacity production."

There was also a discouraging lack of support of military needs by the separate agencies controlling the funds required for the domestic jewel bearing production program. As early as March 1942, the War Production Board, which had now succeeded to the responsibilities of the Office of Production Management, recommended that the Defense Supplies Corporation order jewel bearings from domestic manufacturers and advance funds on those orders to provide the companies with necessary working capital. By July 1942 the personnel in the indus-

try exceeded 1,000 people compared with July 1941 in which the total force was about 100. The rapid increase in employment resulted in high training costs which added to the pricing problems of the domestic manufacturers. It was generally realized that American-made jewel bearings would have difficulty in competing with the Swiss product in cost. The War Production Board asked the Air Corps to order all replacement jewels for aircraft instruments from domestic jewel manufacturers in order to give them some business at their higher prices. During this period many instrument manufacturers were living off stockpiles of previously imported jewels. A great deal of smuggling of jewel bearings from Switzerland was successfully carried on. The WPB's suggestion was approved by the Army Air Force, but no jewels were ever purchased by that method.

The War Production Board continued to search for a formula which would permit the fledgling domestic industry to get into volume operations during the difficult transitional period when lower priced supplies of imported jewels were still available to instrument manufacturers. The WPB recommended to the Defense Supplies Corporation that it purchase 6,400,000 instrument rings at 45 cents each from domestic manufacturers to counteract the high cost of the first year's operations. These jewels would then be sold to consumers at OPA ceilings. Though the DSC was urged to take prompt action, DSC refused because of price considerations.

WPB made a further recommendation in September 1942 to DSC asking that it negotiate with domestic manufacturers for the purchase of 8,200,000 jewel bearings, the final price to be determined on the basis of actual cost. This program was intended as a backlog for volume production by the domestic jewel bearing manufacturers and as an aid to them in borrowing operating capital. DSC failed to accept this recommendation.

Through this period the Air Force, concerned with the imminent loss of jewel bearings for aircraft instruments, endeavored to cooperate with the War Production Board in every way to alleviate the problems of the domestic jewel bearing manufacturers. When the Defense Supplies Corporation had failed to take any action by the middle of November 1942, the Air Force, anxious to back the jewel bearing manufacturers to the limit, offered to place orders directly with them unless the DSC took immediate action. By this time the domestic jeweled watch manufacturers were ready to accept quantity orders for domestically produced jewel bearings but could not obtain such orders from aircraft instrument manufacturers because of the price differentials between their jewels and imports. On November 16, 1942, the War Production Board again requested immediate action by the Defense Supplies Corporation. Contracts were placed by DSC with Bulova, Elgin, Hamilton, and four other manufacturers. These contracts covered the estimated production of each firm to December 1943. Authorizations for the purchase of 20 million jewel bearings from the domestic industry were approved by the Defense Supplies Corporation. The amount actually contracted for, however, never reached half of this figure.

The instrument jewel crisis

The delay in getting a domestic production program under way caused a real crisis in the production of precision instruments for military needs. Until November 1942 imports of jewel bearings continued to be received via smuggling and other sources. But no imports were received in the United States from November 1942 to March 1943. So critical was the shortage that the War Production Board wrote a jeweled watch manufacturer that,

"The production of instrument jewel bearings is a vital factor in our program for increasing aircraft production. As a result, jewel bearings have been designated one of the 35 most critical components of military production for which orders must be placed and scheduled through the entire year.

"You and every other jewel bearing manufacturer have received a schedule showing the production required of you for the remainder of the year. If this production is not maintained, a shortage of jewel bearings will result, which in turn will necessitate reducing the number of aircraft instruments produced or substituting inferior material."

The WPB History of Jewel Bearing recounts,

"For many months the problem of coordinating supply with military requirements was actually the conservation of the existing supply. Imports had not been received from November, 1942 to March 1943, and the very bottom of the supply was scraped. The domestic industry was struggling to get its facilities going and its personnel trained. Authorities were counting on a substitution

factor of glass vees at the rate of 40 percent. When the supply dwindled to the low point in early 1943 it was realized that glass would have to be substituted more widely in order to fill the requirements. Tests were made which showed that glass could be used to a much greater extent and that substitution could be as high as 90 percent if necessary. Under pressure it climbed steadily until it reached 87 percent in July 1943. To meet the military requirements for rings during the critical period when the supply was so short, the watch companies concentrated on converting their own large size watch jewels to instrument sizes. Breakage was high and converted jewels were expensive but they saved the day."

The situation became so desperate during this period that special couriers shuttled between the plants of the jeweled watch companies and the instrument manufacturers delivering each day's output of jewel bearings.

Pennywise policies in midstream stunted the growth of domestic production

By mid-1943 the crisis was licked as the domestic jewel bearing industry began turning out instrument jewel bearings in large volume. By midsummer 1943, the sizable production of the domestic industry and the receipt of sizable imports of Swiss jewels reaching the United States through smuggling and other devious routes brought stocks to such a point that the authorities considered terminating the high cost domestic production. In the space of 1 short year the governmental thinking concerning the industry changed incredibly from a determination to assist it in becoming established for volume production to the question of what to do with the industry as the stock of bearings began to reach, with the aid of imports, more adequate levels. The "history" records,

"In the middle of 1943 requirements for instrument rings began to drop. At this time the ring jewel manufacturers had just gotten into mass production. They were never allowed to reach capacity production because their quotas were cut back to prevent the accumulation of too large a quantity of jewels of these types in the government stockpile. The question at this point was how far to cut the ring-jewel manufacturers back * * *. In the course of discussions, this question of how far to cut back production developed into the question of imports versus domestic production. Imports were still uncertain. * * * DSC objected to the cost of the domestic industry. At the same time the armed services insisted that an ample supply of jewel bearings be available at all times. Hence the dilemma of WPB. If imports were uncertain and if domestic production were cut back, how could WPB guarantee that jewel bearings would be available in sufficient quantities at all times?

* * * Finally a compromise program was decided upon, * * *. This program covered four points: (1) Aim for a balanced 1-year stockpile * * *; (2) * * * endeavor to import through DSC * * * the jewels needed to bring about (a one-year stockpile): (3) continue to schedule production for all American manufacturers at their current rate putting the most critically needed jewels on such schedule; (4) if by April 1, 1944, * * * imports are coming in sufficiently well, American manufacturers would be notified that the (DSC contracts would be terminated)."

The watch jewel crisis

While the controversy over the policy to be followed in scheduling domestic production and imports of instrument bearings was running its course, the situation on jewel bearings for military timepieces became critical. In October 1943 the War Department had requested the WPB to advise if domestic production plus stocks on hand were sufficient to meet all military and essential civilian requirements for watch jewels. WPB had advised that stocks were large enough to allow sufficient time for increasing domestic production so that all requirements could be met. It asked that if imports were to be discontinued, WPB be advised so that domestic production could be increased without delay. This action by the WPB reflected opinion on its part which was undoubtedly correct, that the domestic manufacturers of jewel bearings had the capacity to increase their production of bearings considerably beyond the high volume production which had already been achieved by 1943. The WPB warned the War Department, however, that when Swiss imports again became available, the country might be embarrassed with as much as $3 million worth of jewel bearings in the stockpile.

During the early part of 1944 the War Production Board diverted the production of Elgin, Hamilton, and Bulova to the manufacture of jewel bearings for use in military timepieces. Simultaneously, the WPB through the United

States Commercial Co. contracted for the import of 13½ million timekeeping jewels.

The imports of watch jewels upon which the WPB was relying to meet early 1944 military needs failed to arrive. A new crisis on jewel bearings resulted. During the summer of 1944 stocks of jewels for military timepieces of certain types and sizes reached a very low point. The WPB considered the advisability of increasing domestic production of jewel bearings to meet the military requirements.

Once again, the decision actually made was to temporize with the crisis, and bank upon getting the imports through, rather than to expand domestic production to insure an adequate supply of bearings for military needs. The History reports the incident as follows:

"Jewel bearings were placed on list II of general imports order M–63 effective January 12, 1944, and private concerns were allotted exchange quotas and were given authorization to import jewels which were needed for military production. Normal trade channels were not open so all imports were brought in by special arrangements through ATC under a priority system. The Government, through USCC, placed an order for watch jewels, stocks of which had been exhausted by this time and certain types and sizes had become critical. The production facilities of Elgin, Hamilton, and Bulova had already been converted to watch jewel production but time was required to convert from the production of instrument jewels to the manufacture of watch jewels. The watch jewel situation became acute in July of 1944. A meeting was called of the Joint Jewel Bearing Committee (Government) on August 11 at which time it was decided to increase the domestic production of watch jewels in order to achieve an adequate stock position in each type and size. Requirements for military purposes were not definitely known but it was believed that such an increase would mean doubling or tripling the domestic production.

"The representatives of DSC and WPB objected to increasing domestic production and brought up again the cost of maintaining the domestic industry. They believed that jewels could be imported and that the domestic industry should be reduced. The Army representatives stated that it was essential that there be some guaranty of an adequate supply of watch jewels and stated that the Army would be willing to pay its part of the cost of manufacturing jewels domestically. The problem of DSC being reimbursed by the armed services was a very complicated one. Although all branches of the armed services were willing to stand their share of the expense such a plan would have been impossible to carry out."

When the Allied armies reached the Swiss border late in 1944, all further difficulty in the importation of jewel bearings from Switzerland ceased. In September 1944, the large order of Swiss jewels placed earlier in the year began to flow in from Switzerland, and by the 9th of December that order was completed. The watch jewel crisis was ended. The WPB promptly requested approval of the armed services for the cancellation of the domestic industry's contracts.

The Army opposed termination of the jeweled-watch industry's production of jewel bearings

The Army demurred to WPB's proposal, feeling that the situation would not permit cancellation of the contracts held by Bulova, Elgin, and Hamilton. In October 1944, Under Secretary of War Patterson wrote the WPB stating that in the opinion of the War Department the United States should continue on a self-sufficient basis in the production of jewel bearings. It should not rely on Swiss imports for war requirements. The WPB inquired again of the Army in December 1944, on this subject. Secretary Patterson advised on December 8, 1944, that the schedule of jewel-bearing production should be made solely on the basis of domestic production and jewel bearings under our physical control. Bulova's contract was allowed to expire at the end of December 1944, however, though Elgin's and Hamilton's contracts were extended into 1945.

THE ROLE OF THE JEWELED-WATCH INDUSTRY IN THE WORLD WAR II JEWEL-BEARING PROGRAM

Some indication of the essential role of the domestic jeweled-watch industry in World War II production of jewel bearings has already been given. The History of Jewel Bearings pays the domestic companies this tribute:

"Delicate watch jewels of minute size have been manufactured successfully by the jewel-bearing plants of 3 watch companies, 2 of which have also succeeded in the manufacture of jewels for the sensitive mechanism called the chronometer.

Whereas the Swiss industry is the product of generations, the American industry, in the short span of a year and a half had built machinery, recruited and trained personnel in the delicate, precise, and meticulous details of jewel manufacture and was producing jewels of excellent quality in large quantities from American-made synthetic sapphire and ruby."

The history tells in more detail the contributions of each of the companies. Of the Bulova Watch Co., it notes:

"From November 1941, until June 1942, practically the entire management and engineering staff of the Bulova factory was devoted exclusively to the jewel problem. First, to develop and improve the machinery and second, to perfect the technique of jewel manufacture.

"In addition to manufacturing the machinery under Defense Plant Corporation pool order for distribution to the various jewel-bearing suppliers, Bulova Watch Co., set up a jewel bearing plant with sufficient machinery to enable it to produce between 400,000 and 500,000 ring jewels per month.

* * * * * * *

"The Bulova jewel bearing plant was initially set up to manufacture watch jewel bearings; however, the need for instrument jewels became so acute that before the plant was completed and in working condition, plans were being made for the use of the entire facilities for the manufacture of aircraft ring jewels. The company was given a Defense Supplies Corporation contract for the manufacture of 3,500,000 ring jewels to be manufactured and supplied before December 31, 1943.

* * * * * * *

"* * * The watch-jewel situation was becoming acute. Bulova was therefore requested by WPB to divert part of its production facilities to the manufacture of watch jewel bearings. DSC was requested to amend the Bulova contract so that Bulova could deliver 2,200,000 finished instrument bearings and 600,000 watch jewel bearings and the delivery date was extended to August 31, 1944. For production during the balance of the year, DSC contracted with Bulova for the delivery of 825,000 watch jewels. Bulova completed both of the contracts * * *."

Elgin National Watch Co.'s role is described:

"In 1935 Elgin National Watch Co. sent a representative to Switzerland to procure a complete line of jewel-bearing machinery and during the period from 1935 to 1937 Elgin assembled a line of Swiss machinery and put this pilot plant into operation. In 1941 this plant was expanded considerably in the interest of developing the production of jewel bearings. During the early part of 1942 the jewel plant was moved to Aurora, Ill.

"The Elgin Co. developed some new equipment for jewel-bearing manufacture and had the machinery installed in its pilot plant. These machines were produced by local machine tool manufacturers to the Elgin specifications. The majority of the machinery, however, is from the Bunter line produced by Bulova Watch Co.

* * * * * * *

"Elgin was given a DPC jewel-bearing contract for the manufacture of 1,725,000 jewel bearings to be delivered by December 31, 1943. As time passed Elgin's production proceeded nicely and contracts for additional quantities were granted DSC. Elgin's final contract called for the delivery of 850,000 jewel bearings and expired on June 30, 1945.

"At first Elgin's production was devoted primarily to the manufacture of aircraft ring jewels with some minor production of watch jewels. Later, as the demand for aircraft rings fell off and the supply in the United States had increased, Elgin production was devoted entirely to the manufacture of watch jewels which in the meantime had become critical."

Of the Hamilton Watch Co., the history states—

"The Hamilton Watch Co., foreseeing an impending shortage in jewel bearings, established a jewel-bearing fabrication department. It adopted the policy both of developing its own machinery and of utilizing known methods. The development section of the jewel plant devised some excellent equipment and made the developments available to the jewel bearing industry. The company secured the services of an expert Swiss jewel maker and utilized all the resources at its command. The equipment developed within its own plant has been built to its own specifications and operates in a highly satisfactory manner. Hamilton expanded its own production facilities through a certificate of necessity."

"A Defense Supplies Corporation jewel-bearing contract was given to Hamilton for 2,370,000 jewel bearings to be delivered by December 31, 1943. As the urgency or the urgent need for ring jewel bearings for aircraft instruments was reduced the production of Hamilton Watch Co. was curtailed and Hamilton was requested to concentrate primarily on the production of watch jewels. Accordingly, the Defense Supplies Corporation jewel-bearing contract was reduced to 1 million jewel bearings and the delivery date was extended to June 30, 1944. In order to keep the plant going as a sort of pilot proposition, the Hamilton contract was amended several times, the last amendment bringing the total to be produced to 2,615,000 and extending the delivery date to December 31, 1945. * * *."

It should be noted that the preparations for jewel-bearing manufacture by all three watch companies prior to the war were entirely at their own expense.

At the time the creation of a domestic jewel bearing industry was recommended by the Munitions Board in 1940, there were but 2 concerns producing jewel bearings domestically in any significant quantity and 8 other very small producers. One of the main companies, Aurele M. Gatti, Inc., was manufacturing vee jewel bearings in Puerto Rico with low-cost labor using old Swiss machines. The other main company, Moser Jewel Co., operated primarily as an importer, finishing off and setting imported jewels other than watch jewels.

The three services and WPB sought out every potential producer. From July 1941, until August 1944, new sources of domestic supply were sought and subsidized. In one way or another 27 producers were publicly financed. These ranged from the three watch companies down to Wareboro Jewel Co., Waltham, Mass., which consisted of two operators, in the basement of their home. Altogether, 2,200 people were employed in production of bearings, at the peak of the program, of which 900 were in the watch industry.

An indication of the relative contribution of the eight principal domestic producers is given by the following amounts set as quotas and contracted for by the Defense Supplies Corporation near the end of 1942:

Bulova Watch Co	3,500,000
Elgin National Watch Co	1,725,000
Hamilton Watch Co	2,370,000
Eastern Specialty Co	440,000
Adolph Meller Co	300,000
Louis Levin & Co	200,000
John Worley Jewel Co	160,000
Meyer Koulish Co., Inc	100,000

It is worth noting that the reject rate for the three watch companies was only 9.3 percent, while that of all other domestic producers was 22.7 percent.

The domestic jeweled watch companies were ideally suited to form the nucleus of the new jewel bearing industry. Each of the companies had the foresight to proceed on its own with the development of suitable machinery and techniques for the domestic manufacture of jewel bearings. The men who worked on jewel bearings in watch factories had an advantage over the old-line jewel makers, who employed hand methods, because they were accustomed to machinery methods and were familiar with precision gaging and quality inspection.

During the brief period of Government subsidy and support for a domestic jewel bearing industry, the domestic jewel watch companies produced the following quantities of jewels under Defense Supplies Corporation contracts:

Bulova Watch Co	3,625,000
Elgin National Watch Co	5,491,560
Hamilton Watch Co	2,615,000

The industry not only produced machines for the watch industry and for other producers, but gave technical assistance in establishment of production lines and methods for other producers. It supplied the critical shortage of instrument bearings in the winter of 1942 and 1943. It supplied all domestically made timepiece bearings, which are smaller and more difficult to manufacture.

Had it not been for this domestic production, the United States could not have surmounted the instrument bearing crisis in 1943 and the watch bearing crisis in 1944, when imports stopped entirely. Though smuggled imports came in throughout the war in large quantity, average 64 million bearings per year, just as before the war, they were so erratic and undependable that domestic production was essential to the war effort. Furthermore, even though wartime imports of jewel

bearings continued, domestic facilities were called upon to produce over 12 million additional jewel bearings to supplement the imports.

The WPB's practice of placing chief reliance on imports could easily have resulted in a hopeless loss of critical war production. The WPB's History describes some of the problems associated with an attempted reliance on imports:

"Coordinating the supply with military requirements was no easy matter, because military requirements were always changing.

"In the first place, it was difficult to determine what would be required in the way of jewel bearings for military purposes. A survey late in 1940 indicated that the great need would be for jewels for watches. A year later interest was centered around the question of supplying jewels for instruments to equip thousands of planes per month as well as those for Signal Corps instruments.

"Jewels were purchased from abroad as rapidly and in as large quantities as possible to provide a supply sufficient to permit the domestic manufacturing industry to establish itself and get into full swing. As nearly as possible the foreign orders were based on military requirements. When a significant change was anticipated efforts were made to alter the foreign orders accordingly. The remoteness of this source, however, and the various difficulties which resulted from the whole European political and military situation made perfect coordination impossible. From 6 to 12 months had to be allowed for delivery of the jewels and even actual delivery was problematical."

The World War II jewel bearing policy, after beginning on the note of creating domestic self-sufficiency, shifted its emphasis in midstream to a purely cost approach. WPB "tried to coordinate the import program with the domestic program in order to reduce cost," as the WPB History frankly states. It is not surprising under such an approach that neither the volume nor the cost of domestic jewels reached completely satisfactory levels. The History acknowledges,

"Because it was impossible to follow one program or the other exclusively, the domestic jewel bearing industry was never actually permitted to operate at full capacity and could not realize the decreasing costs which would have come with increased production. We do not know what industry could have done toward reducing production costs. As it was, the costs were reduced from close to a dollar to 35 cents in efficient plants."

PROPOSALS DURING WORLD WAR II FOR A POSTWAR DOMESTIC JEWEL BEARING PROGRAM

In 1944 the domestic jeweled watch companies were quite concerned that the Government undertake a program for the continuance of a domestic jewel bearing industry. Discussions were initiated in June 1944 with the Chief of the Jewel Bearing Section, WPB, to investigate the possibility of such a program. In September 1944 Bulova, Elgin, and Hamilton each wrote the WPB on the subject. Elgin stated that a continuing program should be worked out to maintain skills in the fabrication of jewel bearings and to develop new and better methods of production. Bulova suggested that a central plant be organized as a composite of the then existing jewel bearing plants of the three watch companies. The plant would have been equipped with Defense Plants Corporation machinery, financed by the RFC, and act as a pilot plant to develop new methods of operation. Hamilton recommended that a survey of the production methods then in use in each of the watch companies be made by an engineering firm and that the armed services consider a research project for the improvement of manufacturing processes.

The WPB submitted a memorandum in September 1944 to the armed services suggesting (1) the establishment of a pilot plant which would produce jewel bearings under an arsenal program; (2) arrange for each jeweled watch manufacturer to continue the production of jewels in its plants; or (3) an arrangement with the companies for the establishment of a single plant to be jointly controlled by the armed services and private industry. The Army, Navy, and Air Corps registered strong approval of a program to continue the domestic jewel bearing industry.

Admiral Hussey, Chief of the Bureau of Ordnance, recommended a study of equipment, methods, job descriptions, etc., at all factories producing jewel bearings. An engineering firm would make the survey, and recommend the most efficient methods of production. On the completion of the study, a pilot

plant in accordance with the most efficient methods would be established under Government subsidy until it could become self-sustaining competitively. It was finally decided by WPB to establish a research project to see if new methods of production could be developed. On May 2, 1945, a research contract was executed between the Office of Production, Research and Development, War Production Board, and the Battelle Memorial Institute, Columbus, Ohio, to perform such a study. A steering committee suggested that the investigation be conducted in accordance with the following priority: (1) timekeeping jewels; (2) aircraft instrument jewels; (3) vee jewels for electrical instruments; (4) compass and watt-hour meter cup jewels. The first objective of the institute was to study the production methods then being followed by Hamilton and Elgin. What recommendations, if any, resulted from that study are not known.

It suffices to say that the jewel bearing production facilities of the three watch companies were dismantled, their machinery shipped into Government storage, and the skilled personnel who had been trained in jewel bearing production released or assigned to other duties. In short, with the removal of Government interest and support in postwar jewel bearing manufacture, the existing production facilities quickly collapsed.

THE COLD WAR REVIVED THE INTEREST OF THE ARMED SERVICES IN A DOMESTIC JEWEL BEARING INDUSTRY

The Air Force program

The Air Force from the beginning of the jewel bearing problem in World War II consistently displayed intense concern that an adequate domestic source of jewel bearings be developed and maintained. With the great increase in precision instrumentation of the military aircraft developed after World War II, this concern was quick to manifest itself again. Many hundreds of jewel bearings are required in the instruments used in a single bomber; one fighter alone uses 1,600 jewel bearings in its instruments.

In 1949 the Air Force contracted with the Elgin National Watch Co. for the development of entirely new machines and new and less costly methods of jewel bearing manufacture. Under the contract Elgin was to establish a protoype manufacturing facility for jewel bearings. The actual product to be developed under the contract is a completely integrated pilot production line consisting of 26 different types of automatic or semiautomatic machines. Expansion of the pilot production line into a completely integrated manufacturing facility should require the provision of the pilot line of equipment in multiples. A total of 125 machines distributed through the 26 different types operated by 100 production workers will yield a daily production per line of 30,000 finished watch and equipment jewels other than the vee type. This will mean a yearly production per line of 7,500,000 bearings, using 250 workdays per year. Yearly production per man will be 75,000 jewel bearings.

The contract is now nearing completion. Elgin has constructed at least 1 each of the 26 different types of machines. Continuous progress has been made in the improvement and refinement of each of these types of machines. The emphasis of the project has been to increase the automatic operation of the various machines with accompanying deemphasis of the amount of skill required of the machine operators. The new machines accomplish this so successfully that the production jobs have been deskilled to a point where an average training period will be about 2 months. The nature of the machine operations, the minute size and extremely close tolerances to which the jewels must be held, will require that the supervisory personnel be drawn from the personnel with a background in the watch industry. Special training of at least a year and a half to 2 years will be required for the supervisors. Final inspection work on the prototype line will definitely require a background of training in the watch industry. The standards of acceptability for use in a precision watch constitute the criteria which the inspector must apply in determining whether or not the bearings produced on the line are suitable for use.

Maintenance personnel for the line must be drawn from the watch industry. The tools used are extremely small and it is only in the jeweled-watch industry that skills are developed for the proper maintenance of such equipment. For example, Elgin has developed under this contract a power drill for drilling holes smaller than a human hair in jewel bearings about the size of a grain of sand.

Given ready access to machinery building facilities, each of the types of machines required in the Elgin prototype production line can be produced in about 4 months. The training time for production workers will be less than that; hence, the achievement to which this project points is the creation of the nucleus of a

domestic industry which with relative rapidity may be expanded to meet the needs of full mobilization.

The production methods followed in Switzerland using a relatively large amount of skilled labor yield an output of about 50,000 jewel bearings per worker per year. The relatively low wages received by skilled workers in Switzerland in comparison with similar workmen in this country make it impossible for bearings to be produced in the United States by such methods at a price which will be competitive with the Swiss imports; hence, the emphasis on refinement and upgrading to automatic operation of the machines for use in manufacturing bearings in this country. The achievement of the Elgin National Watch Co. under the Air Force contract is in the elimination of skills, the reduction of the labor input, and the increase in automatic machine operations. These together have yielded a prototype production line which is expected to produce 75,000 jewel bearings per worker per year. Elgin believes that by continued research and improvement of the production machinery and refinement of production methods, production of over 10 million jewel bearings per line per year will ultimately be achieved. This is a per worker rate of over 100,000 jewel bearings per year. These rates should be compared with the World War II rate of domestic jewel bearing producers of approximately 15,000 to 20,000 jewel bearings per worker per year.

The Army program

The Army also has been greatly concerned with the creation of adequate domestic facilities for the manufacture of jewel bearings. On June 3, 1952, the Ordnance Department in request for proposal N–2198 requested any interested source in the United States to submit a proposal for the construction and operation of a facility at Rolla, N. Dak. This facility, known as the Turtle Mountain Ordnance Plant, will have as its sole activity the manufacture of watch jewel bearings. The domestic jeweled watch manufacturers were the only companies submitting proposals in response to this invitation. The Bulova Watch Co. was awarded the contract, and in the space of 16 months has established in two buildings in Rolla, N. Dak. manufacturing facilities employing at the present time about 100 people. The production workers are Indians drawn from the reservation situated in the area. Supervisory and maintenance personnel have been supplied by Bulova from its organization. The machinery installed in the plant is that which was used by the domestic jewel bearing manufacturers during World War II. Production is organized in units of 75 people each. By the end of the year 150 production workers will be producing at the rate of 3½ to 5 million jewel bearings per year.

The Rolla facility is believed to be capable of approximately threefold expansion which would involve a total ultimate employment of some 500 workers. The approach manifest in the project is the utilization of presently known methods and machinery by workers situated in a relatively low standard of living area. It is significant that only the domestic jeweled watch companies were interested or, indeed, capable of undertaking the creation and operation of this facility which has been established by direction of the Under Secretary of the Army to provide in part for the Army's critical need of jewel bearings in the event of full mobilization.

CONCLUSION AND RECOMMENDATIONS

During World War II when Swiss imports of jewel bearings were cut off for a time by German encirclement, the armed services were forced to rely on domestic production, supplied principally by the jeweled-watch industry, to fill their essential needs for jewel bearings in the many types of precision instrumentation controlling materiel of war. The technological advances in the engines of war which have occurred since then have carried in their train a greatly increased reliance upon precision instrumentation. In the event of full mobilization jewel bearings would be required for use in essential end items of war in the order of between 100 and 200 million bearings per year. Switzerland, now the principal source of supply for jewel bearings for the United States, sits with easy vulnerability within the immediate reach of the Iron Curtain countries. In the unhappy event of open warfare between Soviet Russia and the United States, a logical and not unlikely move by the Russians would be to isolate Switzerland from the free world in order to deny the United States and her allies access to their principal supply of jewel bearings and other strategic military items.

Indispensable, therefore, to the mobilization planning looking to the security and welfare of the United States is a realistic plan for the swift expansion of domestic production of jewel bearings to accommodate an annual output in the order of at least 150 million bearings. The domestic jeweled-watch industry is vital to this expansion potential. The Army and the Air Force have evidenced the natural concern which the military must feel for self-sufficiency in this strategic item of jewel bearings by their financing and support of the Elgin and Bulova projects described above.

The capacity at Rolla under ideal conditions could not reasonably be expanded beyond an annual output of 15 million bearings per year with a force of 500 workers. In the present stage of its development, the Elgin prototype jewel bearing production line with its bank of 125 machines of 26 types operated by 100 workers would be readily expansible, given access to machinery-producing facilities and a jeweled-watch industry to supply the supervision, maintenance, inspection, and the training of the production workers. The Elgin 100-man, 125-machine line would produce at a minimum 7,500,000 bearings per year and a tenfold expansion at the line's present capacity would yield an annual output of 75 million bearings per year. The four jeweled watch companies—Bulova, Elgin, Hamilton and Waltham—provide the reservoir of skills for such expansion. Given additional time for further refinement of its prototype jewel bearing machinery and methods, Elgin's present development activities show promise of yielding a 50 percent increase in the productivity of its prototype line with an expected production of over 10 million bearings per line per year, or over 100 million bearings per year in a tenfold expansion of the prototype line.

The Nation's industrial and military needs for jewel bearings for precision instruments of all types in the event of full mobilization obviously requires the existence of the domestic jeweled-watch industry as the nucleus for the expansion of the present domestic jewel bearing production projects in an order sufficient in scope to make the Nation independent of imported jewel bearings. Government policy to secure this result should include:

(*a*) Preservation of the domestic jeweled-watch industry;

(*b*) Continuation of the Rolla project to develop its expansion potential;

(*c*) Renewal of the Elgin research project to provide for continued refinement of the machinery and methods of the prototype production line;

(*d*) Completion of one completely staffed and equipped prototype production line upon the completion of the Elgin research project, as extended;

(*e*) Purchase for stockpiling of the machinery to equip one additional Elgin type prototype line;

(*f*) Designation of a suitable source as a planned producer of the machinery components of the prototype line.

Senator DUFF. Senator Cooper would like to ask a question.

Senator COOPER. One of the arguments made by the watch industry was that the skills to make tools, dies, and jigs is necessary for defense. Senator Tydings suggested that the tools could be stockpiled. What is your response to that?

Mr. BULOVA. Tools cannot be stockpiled. First of all, in production they deteriorate, and they have to be replaced. In watch manufacturing it is with the small tools and dies that the tolerances are maintained. You have got these men on our staff that are trained to watch the indicators where we work to millionths of an inch, and they acquire that skill in maintaining and replacing these tools. Tools, jigs, and fixtures do not last; they lose their tolerance with service. The ability to replace that kind of tooling is very important, and that is what you lose when you are not making them.

Senator COOPER. Is there also a possibility in the designing of new devices that new tools would be needed?

Mr. BULOVA. That is right. For example, there is new instrumentation. I brought an item down here—an oscillating crystal. With the outbreak of the Korean war we were informed by the Signal Corps that there was a bottleneck and they could not get enough oscillating crystals. In peacetime you do not need them, or very few of

them. There are sufficient facilities here. They needed hundreds of thousands of them after Korea. We had never made these before. The Signal Corps came and made an inspection of our plant and saw the kind of delicate wire and lapping and polishing work that we did, and begged us to take on a program of making oscillating crystals.

We tooled up for them, and we met that bottleneck. I think you could get Colonel Cayce to come up here from the Signal Corps to testify to that, because he considers that one of his accomplishments in his job, to get the Bulova Watch Co. to make them.

Incidentally, we operated under the Western Electric Co. patents on oscillating crystals. They probably will bear that out. They were not in a position to produce the mass quantities of these little oscillating crystals that run into high kilocycles that are used in walkie-talkies and used in communications throughout the war area. And they need thousands of them.

We were able to pinch-hit in making that production.

I would like to offer in evidence—and I do not have it here—a letter from Colonel Cayce as to our accomplishment in that direction.

Senator DUFF. Do you have the letter?

Mr. BULOVA. I haven't the letter. I never thought of it until just this moment.

Senator DUFF. Would you like to submit it later?

Mr. BULOVA. I would like to submit it.

Senator DUFF. Without objection, that may be done.

(The letter follows:)

FLORENCE, S. C., *July 15, 1952.*

Mr. ARDE BULOVA,
Bulova Watch Co., New York, N. Y.

DEAR MR. BULOVA: Since having left the service last week, I have pondered some of the bright spots in my tour of duty with the Signal Corps supply agency. In my opinion, there was no more important event in my official diary than the entry of Bulova into the crystal program for the armed services.

The aggressive leadership which you personally exerted, and the thorough competence of the Bulova personnel, combined to display the brightest hope for the services of meeting a critical requirement.

You and the Bulova organization certainly are aware of your worth to the services, but I should like to convey to you my personal thinks for the wholehearted and energetic cooperation I received from you, Mr. Gladstone, Mr. Stambaugh and others while I was on active duty with the Signal Corps.

I shall always cherish my relations with you and the Bulova organization, and sincerely hope that one day I may have the opportunity of renewing that relationship.

Sincerely,

FRANK W. CAYCE.

Mr. BULOVA. That was the Signal Corps and had nothing to do with the making of watches.

Senator COOPER. My questions are directed to all here representing the watch industry. There have been many statements made about the skills and the great pool of ability in this industry. Would it be possible to get a statement from the watch companies showing the classification and types of workers or skills and the number and generally what they do and the average time of training for those classifications? Is that possible?

Mr. BULOVA. We have already filed a description of our own apprentice and training program.

Senator COOPER. It has been testified that there are several thousand people in this industry. I would like to know how many of these people are actually skilled men who require 10 years of training, how many require 8 years, how many require 4 years, how many require 2 years, and how many require 6 months.

Mr. BULOVA. We will give you a breakdown on that, Senator. We will be glad to.

Mr. TYDINGS. Senator Cooper, before you leave, you mentioned jigs and dies. I had particular reference to the machine into which these are set. They ought not to be thrown away. They would be very valuable in time of war. Of course, as new tooling is required for different types it will have to be made. But the machines I think we must have if we are to produce these in rapid numbers instead of having them rebuilt again.

Mr. BULOVA. I would like to say this to Senator Cooper; there are new items developed every day. You might make a set of tools for a certain item, and you might even put it aside if you are not using it. But just the same as this 500 series of fuses, those tools and machines will be set aside as standby by the Ordnance Department. On the other hand, there are any number of new items that are developed from day to day. As Secretary Wilson said, he does not know what our jeweled watchmaking facilities would be called upon to make 3 years hence. All I know is that we are continuously producing new items as the scientists and other people develop them with smaller and smaller mechanization which we would be glad to offer in evidence. Our one shortage is the type of watch die and toolmaker that can make the tooling for it. We are short of them today.

Senator DUFF. Is there anything further?

Just step forward, if you please.

EXHIBIT A.—AMERICAN JEWELED WATCH INDUSTRY

Job skills and required training times in United States jeweled watch industry and employment in these jobs on watch production, 1948, 1950, 1954

CATEGORY A.—HOROLOGICAL SKILLS REQUIRING 10 YEARS' TRAINING OR MORE

Job description	1948	1950	1954
Manufacturing engineer, chief	7	7	6
Tool engineer, chief	3	3	3
Methods engineer, chief	4	4	3
Product design engineer, chief	7	7	4
Director of research and development	4	4	3
Director of quality control	3	3	4
Director of manufacturing	6	6	5
Other administrative and executive personnel	78	78	52
General foremen	11	11	11
Foremen, departmental	71	73	52
Job master	183	192	173
Metallurgist, chief	11	11	9
Chemist, chief	5	5	3
Physicist, chief	2	2	2
Crystallographer, chief	2	2	1
Senior research	5	5	5
Model maker	15	14	7
Mechanical engineer	52	50	40
Industrial engineer	18	26	9
Electrical engineer	2	2	2
Tool and die maker, chief	16	12	7
Tool and die maker, class I	87	78	34
Diamond wire drawing diemaker	2	2	2
Steel engraver (tools)	8	8	8
Profile grinder technician—tools and dies	8	6	3
Swiss jig boring and grinding machine technician	9	10	4
Total	617	621	452

CATETORY B—HOROLOGICAL SKILLS REQUIRING 6 TO 10 YEARS' TRAINING

Job description	1948	1950	1954
Design engineer	20	20	16
Tool engineer	4	3	1
Research engineer	13	13	16
Methods engineer	4	3	2
Laboratory technician	6	6	5
Electronic technician	6	5	9
Draftsman	20	20	14
Assistant astronomer	1	1	1
Other technical personnel	17	12	10
Watchmaker classes I–III	50	35	26
Watch adjuster classes I–III	184	143	101
Tool and die maker classes II–III	146	128	79
Diamond tool maker	6	5	4
Pinion master form and cutter maker	18	14	7
Machinists, horological	116	93	71
Total	611	501	362

CATEGORY C—HOROLOGICAL SKILLS REQUIRING 3 TO 6 YEARS TRAINING

Watch assembler class I	122	65	46
Watch hairspring assembler	32	16	9
Watch assembly inspector class I	137	92	60
Pinion and wheel cutting, set up	6	2	3
Screw machine, set up	77	21	16
Multiple-spindle driller, set up	21	17	11
Profile and flat turning, set up	39	31	21
Automatic lathe, set up	80	62	43
Single-purpose bench machines, set up	150	122	95
Spring manufacturing, set up	10	7	5
Watch tool setter	9	5	3
Diamond tool maker	3	3	3
Carbide tool maker	24	22	17
Coordinate measuring machine technician	23	37	9
Other skilled horological workers	410	89	60
Engineer, mechanical	22	20	14
Watchmaker	94	81	72
Watch adjuster	121	111	69
Quality control	1	1	1
Precision miller, set up	44	38	26
Tool and die maker	5	2	1
Thread grinder, precision	7	3	3
Tap and die maker technician	17	13	7
Chronometer adjuster	2	2	2
Chemist, senior	19	17	13
Physicist, senior	5	3	3
Draftsman	11	10	6
Total	1,491	892	625

CATEGORY D—HOROLOGICAL SKILLS REQUIRING 1 TO 3 YEARS' TRAINING

Production heat treater and hardener	13	9	7
Watch finishers	175	145	135
Hairspring assemblers, (truing)	75	59	59
Assembly inspectors (utility)	25	25	20
Automatic lathe operator	45	44	40
Chronometer assembler	2	3	3
Chronometer balance and hairspring assembler	15	13	10
Laboratory technician	18	18	10
Other horological workers	1,882	1,101	730
Total	2,250	1,417	1,014

CATEGORY E—HOROLOGICAL WORKERS REQUIRING LESS THAN 1 YEAR TRAINING

Total	2,440	1,980	1,550

CATEGORY F—WORKERS REQUIRING 6 MONTHS TO 2 YEARS' TRAINING, NOT NECESSARILY IN THE HOROLOGICAL INDUSTRY

Total	758	501	288
Total all workers	8,167	5,912	4,291

EXHIBIT B.—BULOVA WATCH CO.

Skills and training

CATEGORY A—HOROLOGICAL SKILLS REQUIRING 10 YEARS' EXPERIENCE OR MORE

Title	Requirements	Employed on watch manufacture		
		1948	1950	1953
I. Technical supervision:				
Manufacturing engineer, chief	Degree or equivalent and 10 to 12 years experience.	3	3	1
Product design engineer, chief	Degree or equivalent and 10 years experience.	4	4	1
Research and development director	Degree or equivalent and 12 years experience.	1	1	0
Metallurgist, chief	Degree or equivalent and 10 years experience.	1	1	1
Chemist, chief	do	2	2	1
Physicist, chief	do	1	1	0
Crystallographer, chief	do	1	1	0
II. Labor:				
Model maker	10 years experience	6	6	2
Tool and die maker, chief	10-plus years experience	16	12	7
Tool and die maker, class I	10 years experience	45	35	15
Diamond wire drawing diemaker	do	2	2	2
Steel engraver (tools)	do	1	1	1
Profile grinder technician, tools and dies.	do	3	3	2
Swiss jig boring and grinding machine technician.	do	3	3	1
Total		89	75	34

CATEGORY B—HOROLOGICAL SKILLS REQUIRING 6 TO 10 YEARS' EXPERIENCE

I. Technical supervision:				
Tool engineer	Degree or equivalent and 8 to 10 years experience.	4	3	1
Methods engineer, chief	do	4	3	2
II. Labor:				
Tool and die maker, class II	8 to 10 years experience	25	15	10
Tool and die maker, class III	6 to 8 years experience	20	17	10
Toolmaker, diamonds	8 years experience	5	4	3
Pinion master form and cutter maker 0.0001" on sizes and shape.	6 years experience	4	4	2
Electronic technician	do	2	1	1
Total		64	47	29

CATEGORY C—HOROLOGICAL SKILLS REQUIRING 3 TO 5 YEARS' EXPERIENCE

I. Technical supervision: Quality control director.	Degree or equivalent and 3 to 5 years experience.	1	1	1
II. Labor:				
Watchmaker, class I	Makes parts, 5 years experience	3	2	2
Watchmaker, class II	Old watches, 4 years experience	35	29	28
Watchmaker, class III	Current watches, 3 years experience	12	11	10
Watch adjuster, class I	Whole movement, 4 to 5 years experience.	17	13	11
Watch adjuster, class II	Balance and hairspring, 3 years experience.	9	6	6
Precision miller setup	Mikron, Peterman, Bechler, 3 plus years experience.	25	25	20
Multiple-spindle driller setup	S. & V., Kingsbury, Gilman, 2 to 4 years experience.	9	8	4
Automatic lathe setup	Tornos, Bechler, Gibbs, etc., 4 years experience.	6	3	3
Spring manufacturing setup	Melting, rolling, diamond die drawing, 3 years experience.	2	2	1
Tool and die maker, class IV	4 to 6 years experience	5	2	1
Toolmaker, carbide	4 years experience	17	15	10
Thread grinder (precision)	4 to 6 years experience	1	1	1
Coordinate measuring machine technician.	Dixi, Hauser, 3 to 6 years experience	6	6	3
Tap and die maker technician	4 years experience	4	4	2
Chronometer adjuster	5 years experience	1	1	1
Total		153	129	104

CATEGORY D—HOROLOGICAL SKILLS REQUIRING 1 TO 2 YEARS' EXPERIENCE

Title	Requirements	Employed on watch manufacture		
		1948	1950	1953
II. Labor:				
Watch adjuster, class III	2 plus years experience	9	6	6
Watch assembler	Finishers, 2 plus years experience	175	145	135
Hairspring assembler	Truing, overcoiling, 2 plus years experience.	75	59	59
Assembly inspector	Utility, final movement, 2 plus years experience.	25	25	20
Profile and flat turning setup	Mikron, Hauser, Billeter, 2 to 3 years experience.	10	10	7
Automatic lathe operator	Operates above, 2 years experience	45	44	40
Single-purpose bench machines setup	2 years experience	35	35	30
Chronometer assembler	do	2	2	2
Chronometer balance and hairspring assembler.	do	15	13	10
Total		391	339	309
Grand total		697	590	476

EXHIBIT C

UTILIZATION OF EMPLOYEES IN THE DOMESTIC PIN-LEVER WATCH AND CLOCK INDUSTRY

Of the total production team required in the pin-lever watch and clock industry the tool and die workers equal about 20 percent. This includes the designers, jig borers, diemakers, toolmakers, gagemakers and modelmakers.

About 50 percent of the team is employed in the actual manufacture of parts. This includes hairspring manufacture, screw machine operations, cut and press room work, setup men, toolsetters, foremen and other skilled machine operators.

About 20 percent of the team is engaged in subassembly work. This includes the inspectors and foremen, as well as the skilled assembly-line operators and some semiskilled labor.

About 10 percent of the team is employed in casing, strapping, timing and packaging the finished movement. These skills, while necessary to the finished product, are not of a critical nature and new employees can be trained for these jobs very quickly.

This team based on these relative proportions is capable of producing steadily on a single 8-hour shift per day.

TESTIMONY OF DUDLEY S. INGRAHAM, PRESIDENT, THE E. INGRAHAM CO.

Mr. INGRAHAM. I thought Senator Tydings, frankly, made a very fair and honest and excellent statement from his point of view, and I merely wanted to address myself to three things that he said just for the enlightenment of the committee.

He referred to the Eastman Kodak's production, which has been excellent. However, in World War II and the Korean War, Eastman secured most of their critical parts from the Ingraham Co. We furnished them the plates, a lot of dies and tools and fixtures. And since that time we have made a good many tools for them, and given them all the specifications. We have had crews of Eastman engineers in our plant showing them how to make the mechanical time fuse. I think we have practically taught Eastman today how to make all the particular parts required in the 500 series fuse.

I have furnished them equipment and given them dies and given them a great deal of information.

As a matter of interest, I have a rather recent letter addressed to me from Eastman Kodak indicating that they still are not quite up to our standard of production. I think it would be interesting to read from it. I quote from the letter that was written to me a couple of years ago, as follows, from Eastman Kodak:

> Tom Gibbs tells me that you are also making No. 5 gears on a press. This is something I have wanted to try for 10 years, but our tool people say you can't do it. One of these days we are going to try it anyway, although for the present we are cutting them in stacks on fellow straight-line generators.

Incidentally, the method that we use produces a much more accurate gear and very much less expensive and in much greater volume, and we have been using it, I will hazard a guess, for 40 to 50 years. And they write recently that their own toolmakers have maintained over a 10-year period they could not do it. So apparently that is one place where we slipped up, although I thought we had given them all the information.

On the matter of the Borg situation; Borg has been getting all of the critical parts for the fuse from the Ingraham Co. We are making the plates and gears and pinions for them right up to the present time. We have been making most of the critical parts for the fuse Borg had been producing up to the time of the recent cancellation.

I will also point out that Borg are members of our association and are producers of automobile clocks that have a movement very similar to a watch movement.

I would also like to comment on the tool situation because I think it is rather interesting. I am afraid that Senator Tydings rather simplified the tool picture. It is interesting to comment that on the escape wheel for the fuse—I am just taking one example—we require the equivalent of 2½ toolmakers to 1 operator to maintain the tools. They have to be taken out of the tool frames and resharpened and realined so frequently that, forgetting the tool itself, it takes us the time of 2½ toolmakers to 1 operator just to keep the tool in operation.

I am afraid that I do not go along entirely with Mr. Bulova on the matter of tools. I felt personally it was a tremendous mistake when we were authorized to scrap all the tools that we had in the last war. I think that was a tremendous mistake. The reason was, however, that they thought that the 500 series fuse would no longer be used and that the changes in war conditions would require something entirely different, so there was no sense in paying for storage of all these tools.

We had as many as 8, 10, and 12 tools for one operation, backup tools, because a number were required for the operation, and we did, as a matter of fact, scrap all but one set. We kept one set of tools and templates and gages and jigs and fixtures which we put in storage in a special vault, and we are very thankful that we did because they came in very handy in starting up production again when the Korean war began.

But I think the cost of storing such tools is so negligible that they ought to be kept in storage. Nobody can ever tell what the future is going to require. And it did happen that we came back into production on the 500 fuse again.

I think that is all I can add to the picture.

We have submitted, Senator Cooper, in the statement of United States Time Corp., data as to the length of time required to de-

velop the various skills. Ingraham has 240-odd toolmakers, and we haven't got a single grade A toolmaker making subdies that has had less than 15 years' experience, and we don't think a person can possibly qualify to do subdie tool work in less than 12 years. Actually we do not happen to have a man who has had as few as 12 years' experience in that particular grade A die work.

Senator DUFF. I have just received a letter from Hon. Alexander Wiley, the senior Senator from Wisconsin, relating to the subject which we are considering, for inclusion in the record, and if there is no objection, it will be inserted at this point.

(The letter follows:)

UNITED STATES SENATE,
COMMITTEE ON FOREIGN RELATIONS,
July 1, 1954.

HON. JAMES H. DUFF,
Chairman, Senate Preparedness Subcommittee No. 6,
Senate Office Building, Washington, D. C.

MY DEAR MR. CHAIRMAN: I had hoped to be in a position to appear personally this morning in order to present a few observations on the national-defense aspects of preserving America's domestic watch industry. Conflicting engagements made it impossible, however, for me to appear.

May I, however, invite the attention of your associates and yourself to a statement which I had made on the floor of the Senate when I reproduced in the Congressional Record an informative newspaper writeup of this subject. The introductory comments which I made at this time are respectfully submitted in the hope that they may shed further light on this important issue.

Basically, the position which I expressed then and which I reiterate today, is this: as important as is international trade, we must bear in mind that such trade may and does, on occasion, adversely affect an industry vital to our own national defense—our own survival in the event of an all-out emergency, when overseas sources of supplies would be cut off. Therefore, we had best think twice and not permit our desire for trade and, for example, for the closing of Europe's so-called dollar gap to obscure our more paramount responsibility for our own self-protection.

I would appreciate if this letter and my Record statement could be incorporated in your hearing record.

With kindest wishes, I am,
Sincerely yours,

ALEXANDER WILEY.

[From the Congressional Record, April 23, 1954]

PROTECTING NATIONAL SECURITY BY PROTECTING STRATEGIC INDUSTRIES

EXTENSION OF REMARKS OF HON. ALEXANDER WILEY, OF WISCONSIN, IN THE SENATE OF THE UNITED STATES, FRIDAY, APRIL 23, 1954

Mr. WILEY. Mr. President, I have emphasized time and again that, in my judgment, the greatest single obligation of the Congress is to fulfill the first law of nature, so far as our country is concerned.

That first law is, of course, self-preservation. Our job is to preserve this Nation from its enemies, foreign and domestic.

Self-preservation is the principle on which we must decide all of the key questions of national policy.

One such policy relates to America's international trade.

Every thinking person naturally favors an increase in international trade, so as to improve the economic health, the bonds of friendship and understanding among the free nations of the world.

In our process of promoting trade, however, we must always appraise the effect of our trade upon domestic industries. And in one specific area we must be doubly careful, and that is that we do not damage strategic industries which would be indispensable in time of war or other emergency.

In his recent message urging legislative action on the recommendations of the Randall Commission, President Eisenhower rightly stated that our efforts aimed at the highest possible level of trade must be in a manner consistent with our national security.

There is no nation in the world which does not recognize that its own national security must come before any other ideas it may have on promoting wider freedom of trade.

Even here in the United States all the advocates of a more liberal trade policy, including the Public Advisory Board for Mutual Security, the Committee for a National Trade Policy, and others, recognize the significance of this national-security factor.

The issue is highlighted by a problem facing one particular industry today.

I refer to the domestic jeweled-watch manufacturers, whose skills and facilities are soundly regarded by our military leaders as essential to national security.

Yet, the trend of domestic production has been going downward in the face of increasing quantities of watches and watch movements imported from Switzerland.

I send to the desk now the text of a frank, hard-hitting article which was published in the Sunday, April 18, 1954, issue of the New York Herald Tribune by its business and financial editor, Mr. Donald I. Rogers.

The Herald Tribune has to my knowledge long been in favor of trade reciprocity among the nations.

I believe that Mr. Rogers' comments will be of interest to my colleagues. His remarks raise questions of deep concern of all of us, both to Senators, for example, who favor the Randall Commission's majority recommendations and to those who question those recommendations.

I raise this issue because, as chairman of the Senate Foreign Relations Committee, I deeply sense my obligation to encourage a greater degree of understanding among the nations.

But, at the same time, I know that a strong America is the great hope of the world. For her to weaken her own security does not strengthen the free world's security. If we go down, the free world cannot stand.

I ask unanimous consent that the text of Mr. Rogers' article be printed in the appendix of the record.

There being no objection, the article was ordered to be printed in the record, as follows:

APPENDIX

What's Happening in Business: Danger in Freer Trade to United States Security Cited

(By Donald I. Rogers)

In our refreshed zeal to establish freer world trade, a positive objective of the Eisenhower program and the Randall plan, it would be possible to forsake caution to a degree that might jeopardize national security. Such seems to be the case in the deliberations on whether we should raise the tariff on jeweled Swiss watch movements. The worn contentions of the watch industry to the Tariff Commission boiled over in a steaming splash of senatorial words last week, the culmination of a long wrangle over whether this Nation should withdraw concessions granted on the importation of Swiss movements under the Reciprocal Trade Act.

SENATOR HUNT'S STAND

For the benefit of the deliberators on duties, there was read into the Congressional Record of April 6 a statement by Senator Lester C. Hunt in which the Wyoming Democrat charged that the American watch manufacturers do not need protection because there are many concerns capable of making timing devices. In other words, it's his contention that a self-sustained domestic watch industry is of no military or strategic importance.

Senator Hunt is no mechanical engineer. He is, in fact, a dentist. For him to presume such an enormous responsibility as deciding the importance of monstrously complicated industry of proved military significance is unusual.

More important, however, is the fact that he has raised the issue of the watch industry's involvement with national security. A determination of this factor is not in the province of the Tariff Commission. The problem does not belong there. It belongs with the military, the Defense Department, or the Office of Defense Mobilization.

WAR STAND CITED

Even the military cannot be trusted with snap judgment on this. Before our involvement in World War II, a special military commission decided that it was not necessary to manufacture jewel bearings in this country even though the Germans threatened to cut off our supply from Switzerland.

There was near-disastrous confusion a few months later when it was discovered that an American bomber cannot even leave the ground until it has had installed in its various instruments something like 4,000 jewel bearings—along with the horrifying fact that nowhere in the United States was there the machinery or knowledge to make the bearings.

Two men were smuggled out of Switzerland and in time they assembled some of the exceptionally complicated machinery that makes jewel bearings. Months later they had taught a few skilled workers how to produce them.

A good watch has 17 of these jewel bearings. A fighter plane has 1,500 to 2,500. A battleship has 5,000. A bombsight requires up to 350. Ordinarily the United States imports 150 million jewel bearings a year. Because of the World War II experience, we have the nucleus of a bearing industry in Rolla, N. Dak., but the hoped-for rate of production, not yet attained, would result in only 4 or 5 million bearings a year.

INQUIRY URGED

This then is the lesson. It may be that Senator Hunt has been misinformed, and before the domestic watch industry is allowed to perish the whole business should be explored.

For watch manufacturers are unique producers. They are wizards of miniaturization in a time which may call for a war of instrumentation. Skilled watchworkers call "plumbing" the work that employees in other industries regard as being in fine tolerances.

Reciprocity and freer trade may be desirable aims. As it pertains to Swiss watch movements, however, we are not dealing with free traders but with a tightly controlled cartel, and cartels manage to control wage costs.

In 1940 a 17-jeweled Swiss watch movement cost $2.50 plus $2.10 duty, making a total cost of $4.60. At that time American producers could make a watch for $4.25 to $4.50.

Today, because wages have risen somewhat in Switzerland, a typical imported movement costs $4 plus $2.10 duty, for a total cost of $6.10. But in the United States, even with greatly improved efficiency of production, the cost of a similar watch movement is at least $10.50.

Withdrawal of concessions granted importers, as asked by the domestic watch producers, would add 75 cents to $1.65 to the cost of a Swiss watch.

If it can be shown that our own watch industry is, in fact, a vital part of our strategic defense, or more importantly, an irreplaceable part of our security machinery, it is doubtful that Americans would want to imperil their Nation's safety for $1.65 per watch.

Senator DUFF. If there is nothing further, the hearing is adjourned.

(Whereupon, at 12:40 p. m., the subcommittee adjourned.)

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